The Magazine of the Registered Professional Engineer

American Engineer

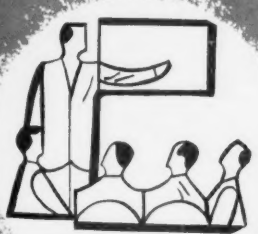
JULY 1961

Professional Development in Industry

AE Special Section
Policies and Programs at:

- GE Instrument Division
- GE Transformer Division
- Quaker Oats Company

(See Page 34)



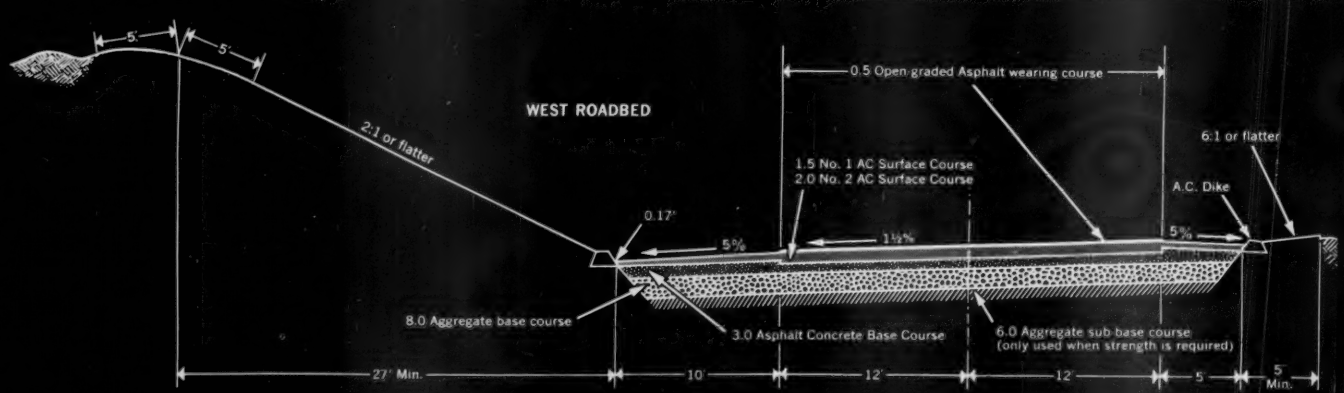
Plus:

- Engineering Unions–Dinosaur in the Space Age
- Summertime Special–Engineering Under Ice

FINISHED ROADWAY on California Interstate Highway 15. Asphalt dikes and embankment on right show unusual drainage design to combat flash floods in Baker Sink region of high Mojave Desert plateau.

ASPHALT DIKES on shoulder edges direct surface water to drainage outlets.

STONE CRUSHERS make use of local aggregate found at site to offer California taxpayers important savings.



CALIFORNIA HIGHWAY ENGINEERS SPECIFY DEEP STRENGTH ASPHALT CONSTRUCTION

Asphalt dikes and ditches to divert Mojave Desert flash flood water from Interstate Highway 15.

California's largest asphalt pavement highway contract used local aggregate crushed on site resulting in substantial economies.

For the 25.2-mile four-lane, divided limited access section of California Interstate Highway 15 that replaces U.S. Route 91 from 1 mile east of Baker, California, to 1 mile east of the Cima Road, engineers of the California Division of Highways chose the Advanced Design Criteria for modern DEEP STRENGTH Asphalt Construction.

Natural Obstacles . . . Location in southeastern California on the high eastern Mojave Desert plateau, with elevations from 1,000 to 4,000 feet, posed some unusual design problems. Temperatures range from 115° in summer to 25° in winter, rainfall averages only 4¾ inches annually (which usually occurs as hard downpours).

Flash floods occur because rainwater reacts with minerals in the dry sand to form an impervious crust. The resulting rapid surface run-off must be controlled to prevent undermining of the roadway. California Division of Highways through many years of study has developed an effective solution to these unique drainage problems by use of diversion ditches and dikes.

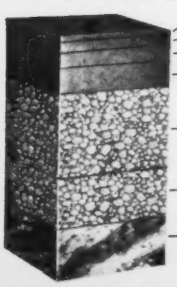
DEEP STRENGTH Design . . . The cross section below shows how California engineers made use of the principles of DEEP STRENGTH Asphalt Construction. Note 4" surface and wearing courses with 3" asphalt-concrete base course. The 8" aggregate base and 6" subbase (where necessary) consist of *water-bound* layers of 1½" max. stone compacted with pneumatic rollers and steel tandem rollers. The 8" aggregate base is primed with 0.25 gal. per sq. yard of SC-2 before asphalt-concrete base course was spread. Total thickness is 15 inches to 21 inches depending on the subsoil.

A median 90 ft. wide was used, with no treatment. (The crust and scant vegetation on median surface was kept intact to minimize erosion during periods of high surface run-off and/or wind.) Outside shoulders are 10 ft. wide and paved. Inside shoulders have 2 ft. paved and 3 ft. unpaved. (In cut sections, 5 ft. wide, all paved.)

Taxpayer Saving . . . DEEP STRENGTH Asphalt Construction allowed California's engineers to use local aggregate crushed at the site. This, plus the inherent economy of Asphalt Construction, results in important savings for the taxpayer of California. And low future maintenance costs on DEEP STRENGTH Asphalt will provide additional tax savings.

THE ASPHALT INSTITUTE College Park, Maryland

THIS IS DEEP STRENGTH DESIGN ON CALIFORNIA INTERSTATE 15



A. Wearing Course	0.5
B. No. 2 AC Surface Course	1.5
C. No. 1 AC Surface Course	2.0
D. Asphalt Concrete Base Course	3.0
E. Aggregate Base Course	8.0
F. Aggregate Subbase	6.0
G. Subgrade or Improved Subgrade	—
TOTAL MAXIMUM THICKNESS	21.0

Letters to the Editor

Youth and Space . . .

Dear Editor:

I would like to commend you on your article, "How Young Engineers View the Space Age," in the May issue of the AMERICAN ENGINEER. The various opinions expressed in it were indeed informative, and the different prospects interesting. Good job!

DAVID E. GLIDDEN
Editor, *Quest Quarterly*
Portland, Ore.

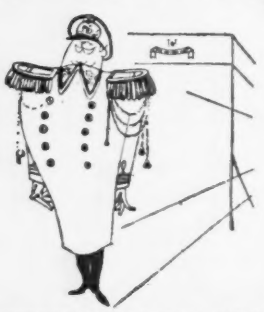
The Hard Way . . .

Dear Editor:

Paul H. Robbins' article in the May issue detailing a problem in the attitude of young engineers is one on which more could be written. I fully agree with Mr. Robbins' thoughts on the matter.

I did, however, get a laugh out of the article in respect to the attitude of the young engineer as expressed, and yet I felt sympathy towards that young engineer and any other who has the same attitude, because that means they are going to learn the hard way that the Canons of Ethics shall be abided by; that the engineering profession is nicely tied together; that engineering is done just exactly the way the profession wants it done and no other way; that true professionalism is a long developing process requiring years; that a diploma is the first rung of the ladder; that technical engineering brilliance is but a small part of the professional engineer; and that conformance with the established rules is the only way to success.

W. J. YOUNGERMAN, P.E.
City Engineer,
Fairmont, Minn.



INTRODUCING THE NEW
DRYDEN-EAST
HOTEL
39th St., East of Lexington Ave.
NEW YORK

Salon-size rooms • Terraces • New appointments, newly decorated • New 21" color TV • FM radio • New controlled air conditioning • New extension phones in bathroom • New private cocktail bar • Choice East Side, midtown area • A new concept of service. Prompt, pleasant, unobtrusive.

Single $15 to $22 Suites to $60
Special rates by the month or lease

Robert Sarason, General Manager
ORegon 9-3900
TELETYPE NY 1-4295

(Circle 1 in Readers' Service Dept.)

BER Case . . .

Dear Editor:

With regard to the "Report on a Case by the Board of Ethical Review, Case No. 60-5" described in the May, 1961, issue of the AMERICAN ENGINEER, consider it highly significant if neither the majority or the dissenting minority group mention the possibility that the State Sanitary Engineer in question could have furnished to the local communities the roster of the American Academy of Sanitary Engineers. One of the purposes of the American Sanitary Engineering Inter-Society Board Certification Program is the furnishing to the public or to interested organizations lists of engineers having special knowledge of sanitary engineering and is evidenced by the certificates granted by the American Sanitary Engineering Inter-Society Board. These certificates, as you undoubtedly are aware, were issued prior to 1959 on the basis of established professional confidence and long years of practice or examination, and subsequently have been issued only on the basis of examination.

ASEIB is sponsored by the American Society of Civil Engineers, the American Waterworks Association, the American Institute of Chemical Engineers, and the Water Pollution Control Federation. In addition, from the Industrial Hygiene Engineering Profession there are two trustees-at-large who are members of the board.

Since one of the requirements for admission to the examinations or for consideration for certification under the eminence clause in the initial formative period is the possession of the right to practice engineering as evidenced by state registration. It is rather startling to note that the Board of Ethical Review did not cite the possibility of the use of the roster of the American Academy as a means of providing information from a completely disinterested source to those needing to know of potential sources of specialized engineering services.

ALVIN F. MEYER, JR., P.E.,
FASCE, Diplomate, AASE,
Omaha, Neb.

Who Was More Wrong? . . .

Dear Editor:

The article on page 11 of the June 1961 AE ("Ohio Court Hits Engineer for Doing Architect's Work") raises some interesting questions.

From the facts given in the article, the College of Steubenville entered into a contract with an engineer for certain services; the services were performed in good faith and were apparently satisfactory; the engineer presented his bill; the college refused to pay it; the engineer sued; and the court upheld the college.

Was the college morally justified in refusing to pay the fee after entering into a contract, even though the contract was technically illegal but injured no one?

Did the college officials sign the contract knowing that it was illegal and therefore seek to take advantage of the engineer on this basis?

Had the college paid the fee without protest, would the case have come to the attention of the court in any manner for a ruling?

It seems to me that an institution of higher learning which is, broadly speaking, dedicated to truth and morality should not stoop so low.

THEODORE E. STEPAN, P.E.
Vicksburg, Miss.

Dear Editor:

I read with interest the article in the June issue concerning the "Ohio Court Hits Engineer for Doing Architect's Work." This article obviously leaves a great deal to be desired. I cannot believe that the College of Steubenville would contract for services and then refuse to pay unless there was something more to the problem

(Continued on page 6)

American Engineer

JULY 1961
Vol. 31, No. 7

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS
FOUNDED 1934

BPA
Member, Business Publications Audit

AMERICAN ENGINEER STAFF

Kenneth E. Trombley,
Editor

Patricia E. Stivers,
Assistant to the Editor

John T. Kane,
Fred Hamlin,
Staff Writers

AMERICAN ENGINEER COMMITTEE

G. Ross Henninger, P. E.
Chairman
H. Carl Bauman, P. E.
Garrie Haulenbeek, P. E.
Frank W. A. Myers, P. E.
Louis A. Warner, P. E.

Professional News and Features

General News 8
Industry 12
Consulting 14
Government 17
Education 19
Society 50

Engineering Unions: Dinosaur in the Space Age 23

The Pursuit of Excellence 29
By Paul J. Grogan, P.E.

Engineering and the Learned Professions 33
By William Lurie

AE Special Section—Professional Development in Industry
General Electric Transformer and Instrument Divisions 35
Quaker Oats Company 38

Summertime Special: Engineering Under Ice 43

Report on Case No. 60-7 by the Board of Ethical Review 47

Regular Departments

Letters 4
This Month 7
Meetings of Note 18
Strictly Business 21
From Washington 27
Professional Profiles 32
Special Report 41
Engineer and the Law 42
New Literature 48
Thoughts on Professionalism 52
Dates to Remember 54
NSPE News Briefs 55
With the Auxiliaries 56
Classified 58
Professional Directory 59
Advertisers' Index 66
Progress in Products 67

ADVERTISING OFFICES:
Leonard Bleyer, Jr.
Advertising Director
230 Park Avenue, Suite 1509
New York 17, N. Y.
Telephone: MUrray Hill 6-8555

Richard B. Kilner
West Coast Representative
465 California St.
San Francisco, Calif.
YUkon 2-9030

EDITORIAL AND BUSINESS OFFICES:
American Engineer
2029 K Street N. W.
Washington 6, D. C.
FEderal 7-2211

The American Engineer is published monthly by the National Society of Professional Engineers, 2029 K St., N. W., Washington 6, D. C., and printed by the National Publishing Company, Washington, D. C. Second Class Postage Paid at Washington, D. C.

Copyright, 1961, by the National Society of Professional Engineers. Not responsible for opinions expressed in signed articles.

Subscription Rates: $3 per year in advance to members of NSPE and its affiliated Societies; $4 per year in advance to non-members in U. S. A. and its possessions, Canada and Mexico. Foreign, $5 per year. Single copy, 50¢.

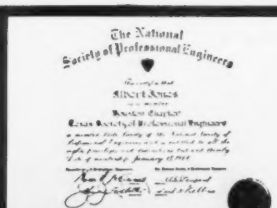
OFFICERS OF THE NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

President: Noah E. Hull, P. E., Hughes Tool Company; P. O. Box 2539, Houston 1, Tex. • Vice Presidents: R. King Rouse, P. E., R. K. Rouse Company, P. O. Box 3765, Greenville, S. C.; Thomas T. Mann, P. E., Box 781, Roswell, New M.; J. H. Stufflebean, P. E., 211 W. Pennington, Tucson, Ariz.; Brandon H. Backlund, P. E., 4924 Poppleton Avenue, Omaha, Nebr.; Ben G. Elliott, 2302 Commonwealth Ave., Madison 5, Wis., and W. Earl Christian, P. E., Netherwood Ave., Box 215, Rd. 24, New Brunswick, N. J. • Past President: Harold A. Mosher, P. E., Kodak Park Works, Rochester 4, N. Y. • Treasurer: Russell B. Allen, P. E., 10406 Rodney Road, Silver Spring, Md. • Executive Director: Paul H. Robbins, P. E. 2029 K Street, N. W., Washington 6, D. C.

Certificates and Emblems are available

The Professional Engineer emblem is available styled as cuff links. Can also be ordered in large 3" size as a metal automobile emblem.

The beautiful Society shield is available in several styles. See coupon below.

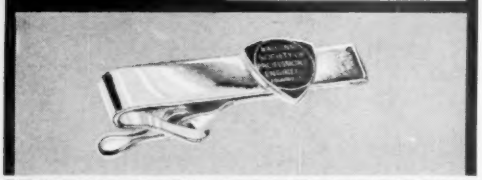


Order one of the handsome certificates showing your NSPE affiliation for your office wall.

Now available for the ladies is a beautiful Ladies Auxiliary Insignia.

The shield mounted as a tie chain makes a perfect gift. ➡

The shield worn as a tie clasp is distinctive jewelry for any professional engineer member. ⬇



NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS
2029 K Street, N. W., Washington 6, D. C.

I am enclosing my check in the amount of $ ——— for which please send me For Professional Engineers, P. E., and Junior Members, J. M.

J.M.	P.E.	
☐	☐	Certificate No. 1 with Chapter and State designation, priced at $1.50
☐	☐	Certificate No. 2 with State designation, priced at $1.50
☐	☐	American Engineer Binder, priced at $3.00
☐	☐	Shield, mounted as a charm, priced at $5.00
☐	☐	Shield, mounted as a pin, priced at $5.00
☐	☐	Miniature Shield, mounted on lapel button (⅜"), priced at $2.50
	☐	Miniature Shield, mounted on tie clip, priced at $2.50
	☐	Shield, mounted on tie chain, priced at $2.50
	☐	Professional Engineer Emblem cuff links (set), priced at $3.00
	☐	Automobile Emblem (3"), priced at $1.00
☐		Ladies Auxiliary Insignia, mounted as a pin, priced at $5.00
☐		Ladies Auxiliary Insignia, mounted as a charm, priced at $5.00

PLEASE MAIL TO _____

ADDRESS _____ REG. NO. _____

CITY _____ STATE ____ ZONE _____

I am a member of the _____ Society of Professional Engineers.
State

(and if Certificate No. 1 is desired) _____
Chapter

Charms and pins (exclusive of lapel buttons) engraved upon request

(Continued from page 4)

than is written in the article. Furthermore, the author of the article claims that the opinion of the court was that the law was intended to protect each of the professions in their respective fields of endeavor. I find this running contrary to my understanding of the law. I thought the law was to protect the public and not the professions.

Furthermore, the article claims that designing buildings is primarily architectural rather than engineering. Earlier in the article it was stated that the services were to furnish architectural work, structural, plumbing, heating, electrical, and other mechanical work. If the court had no more information than is contained in this article and ruled as it did, the engineer must have a pretty poor lawyer.

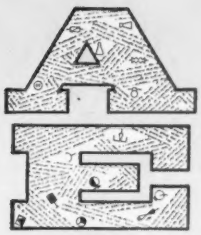
Frankly, it is my honest opinion that modern construction of almost any type structure involves a predominance of engineering rather than architecture. If the engineer could not get this across to a judge, there must be other facets to the case not mentioned herein. I also doubt that any court in the land can honestly contend that the registration laws are justified on the basis of protecting any particular profession. I am certain that if the ruling were appealed, a successful case could be built around whether or not the client got what he paid for.

It further seems doubtful to me that any college would refuse to pay fees if it did receive what it contracted for in the first place.

I feel that amplification of this article is essential. Many people are liable to take the article as written and try to justify a position detrimental to engineers. Everything inferred herein runs contrary to many existing cases that have already been decided otherwise. The implications found in this article are not in the best interest of the professional engineer.

E. M. Dougherty, P.E.,
Nashville, Tenn.

► **Editor's Note: In this case, as in others of a similar nature in the past, the question comes before the court as a result of a disagreement between the client and the consultant. The *background and nature* of the disagreement is not considered by a court when the defense files a motion to dismiss a suit on the ground that the services were performed by one *not legally authorized to perform such services*. The engineer has filed an appeal in this case, the results of which will be published when an opinion is rendered.**



"This Month"

For a few years in the early Fifties the engineering unions travelled the high road . . . gathering strength . . . winning elections . . . talking a lot. Then, for what were almost vague and obscure reasons, the bubble burst. Why? Our staff report "This Month," "The Engineering Union—Dinosaur in the Space Age" paints a truly intriguing history of this abortive movement. Page 23 starts it.

A revealing study of an engineer's needs in the years to come is "The Pursuit of Excellence" beginning on page 29. And in "Engineering and the Learned Professions", page 33, we find comment on articles by Admiral Rickover that appeared in AE some months back.

Special Section: Here are three stimulating pieces dealing with three outstanding professional programs for engineers at two General Electric divisions and the Quaker Oats Co. Don't miss these—page 34.

Hot? Cool off with our Summertime Special: "Engineering Under Ice"—page 43.

And three short features that are just the thing to go with ice tea or mint juleps on the patio: Special Report features new data on the engineer in state government . . . page 41; The Engineer and the Law brings more on the Long patent Bill . . . page 42; and Case No. 60-7—Board of Ethical Review opines on competitive materials . . . page 47.

Off the news wire "This Month":

General. Page 8. The headlines: Professional Employees Denied Separate Decertification Vote . . . Milwaukee P. E.'s Study Engineers in Management . . . GE Engineers Working to Solve Echo Problem . . . AEC Approves Reactor for Texas A&M Research.

Industry. Page 12. The big story is about plans by Reuther's UAW to organize engineering and technical employees in the auto industry. Which is to say that the engineering unions are not dead yet. See also story on page 23.

Consulting. Page 14. The lead story treats hits by the General Accounting Office at certain contract practices in the Highway Program. In other news: For the third time the House has approved a self-employed retirement bill. And a final story covers a recent decision of the Supreme Court of Louisiana clearing an architect and engineer in a boiler explosion case.

Government. Page 17. An excellent story reporting a speech of Civil Service Commission Chairman John W. Macy, Jr., in which he exhorts engineers to work for "improvement not protection." In other stories: House Bill Would Raise Per Diem Travel Rates . . . Senate O.K.'s Assistant Secretary of Science . . . NSPE Moves Quickly Regarding Executive Order.

Education. Page 19. Two stories on new curricula: At UCLA and at Wisconsin. In other developments, AIIE looks for research done in industrial engineering, and up in Sterling Forest, N. Y., Professor F. E. Terman of Stanford, said in a speech that communities who want growth industries will have to beef-up their educational facilities.

And that is the AE "This Month."

Kenneth E. Trombley

Editor

Professionals Are Denied Separate Decertification Vote

NSPE has suggested to a House Labor Subcommittee that present policy of the National Labor Relations Board which denies professional employees a separate decertification election from a mixed unit is not consistent with the Congressional intent of the professional provisions of the Taft-Hartley Act. Paul H. Robbins, NSPE executive director, expressed the Society's views in connection with Subcommittee hearings on the operations and administration of the NLRB.

Robbins told the Subcommittee that for seven years after passage of the Taft-Hartley Act in 1947, the Board allowed professional employees in a mixed unit to petition for a separate election to determine their desires regarding continued representation for collective bargaining. But, in 1955, he said the Board reversed itself and has since maintained that professional employees are not entitled to a separate vote regarding decertification of a bargaining agent if they are represented in a heterogeneous unit with nonprofessional employees. "Thus," Robbins added, "Professionals cannot extricate themselves from a mixed bargaining unit through a separate decertification procedure."

Robbins said present Board policy is particularly unfair to engineers who were included in a mixed unit prior to Taft-Hartley when they had no opportunity for a separate election apart from nonprofessionals in deciding on collective bargaining representation. Consequently, the NSPE spokesman declared that "these individuals are being denied the full benefit of the Congressional mandate which is designed to prevent their being submerged against their will in a collective bargaining unit which could be insensitive to their particular needs and requirements."

Robbins told the Subcommittee that present Society policy favors an amendment to the law to clarify the application of the decertification provision to professional employees represented in a unit with nonprofessionals in order that the professional employee may obtain a separate vote on continued union representation.

"From a practical standpoint," he said, "the present policy of the NLRB is forcing professional employees to resort to the strategy of aligning themselves with an organization devoted strictly to professional employees, which can then file a petition for certification over the opposition of the existing bargaining representative." Citing a specific development of this sort among a group of engineers at the Westinghouse Air Brake Company in 1958, Robbins described the case as illustrative of the unnecessary complications and extensive effort required by professional employees, as well as the NLRB, in seeking to sever their connection with a mixed bargaining unit.

"The National Society," he concluded, "sincerely believes that the NLRB should give serious consideration to revising its present position which refuses professional employees a separate decertification election."

Milwaukee P. E.'s Study Engineers in Management

Before you build a better mousetrap, be sure that people still have a problem with mice. That is if you want to become a boss. That, in effect, was the advice offered to the Engineers' Society of Milwaukee recently by Industrial Design Consultant Joseph Palma, Jr. as a guest lecturer in the society's course on "Engineer in Management."

The engineer aspiring to management today must orientate himself to the customer's needs and the sale of the product, said Palma, president of the design firm of Palma-Knapp Incorporated of River Forest, Illinois, speaking on "The Engineer, the Product and the Customer."

Palma told his audience that the engineer who wants to carve out a management position can no longer do so with only the basic tools of his science and craft. "Sales is always the motivation for designing a product." He suggested that in today's market it is no longer realistic to approach the design of a product with the idea of "making it the best of its kind."

Rather, he said, the engineer should discipline himself to inquire: "How well can we design this product to sell for such and such a price?" In short, he should develop a sense of merchandising.

Conceding that "The engineer gets almost no training in marketing, sales or sales psychology," he said "every engineer in development or production should think in terms of both product and customer . . . no one should be in a management position who does not think in these broad terms.

"To begin, the engineer in charge of a product program should cooperate closely with sales. This will set the broad pattern of his design thinking." The necessity of close cooperation with sales is dictated by the fact that production and sales goals are often instrumental in the choice of tooling, materials and production techniques the engineer must determine.

"In general, the engineer in management must be thoroughly indoctrinated with a merchandising sense. While he will need specialists to help him in all the different aspects to be considered, it is largely up to him to keep the emphasis where it belongs."

(Continued on page 10)

Cubic DM-20 Electrotape system quickly pinpoints location of off-shore installation.

ELECTROTAPE WORKS WHERE CHAIN AND TAPE WON'T:

The new, lightweight, all-transistorized version of Cubic Electrotape, Model DM-20, marks a major breakthrough in the art of surveying. Electrotape eliminates time-consuming chain and tape work, and lets even unskilled operators measure distances from 150 feet to 40 miles in just a few minutes per set-up. Easily operable by one man, the DM-20 weighs only 25 pounds. Its accuracy is 1 centimeter plus 3 parts per million, and the front panel readout is directly in centimeters, eliminating scope or meter interpretations. The DM-20 operates day and night, in any weather, with a built-in radio-telephone permitting communication between operators at all times. A single tripod-mounted unit incorporates the recessed parabolic antenna, regulated power supply, compact battery, and electronic circuits. Write for descriptive literature to Dept. AE-103, Industrial Division, Cubic Corporation, San Diego 11, California.

cubic
CORPORATION
INDUSTRIAL DIVISION
SAN DIEGO 11, CALIFORNIA

(Circle 2 in Readers' Service Dept.)

(Continued from page 8)

Deadline Approaches for Lincoln Arc Welding Papers

Participants in the 1961 $25,000 award program sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, must submit technical papers no later than July 17, 1961, according to a reminder just issued by Foundation secretary C. G. Herbruck.

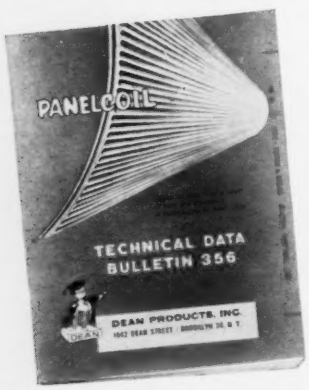
The current competition is the twenty-fifth in a series of annual award programs sponsored by the Foundation, a nonprofit organization dedicated to encouraging research and development in arc welding techniques. Featuring 76 individual awards, the competition is intended not only to recognize achievement in arc welded design, but also to emphasize the technique's advantages to industry.

This year's program will accept technical papers entered in either of two categories, although each paper can compete in only one category. Papers may describe the design of any machine or structure (or components thereof) in which welding is of major importance, and will be evaluated by a jury of award to be selected by the Foundation.

"In sponsoring technical competition at a professional level, the Foundation hopes to break down some of the road blocks we constantly throw in front of ourselves in both design and fabrication," Herbruck commented. "When we see the tremendous savings accumulated in just a few typical applications, we can little afford to overlook welding as a medium for reducing costs and improving structural quality."

The Foundation also announced that complete rules brochures would be mailed upon request. Any resident of the United States who has contributed to the design, planning or manufacture/construction of the subject described in the paper is eligible to participate in the competition.

FREE-NEW BOOK on HEATING and COOLING



Here in simple, concise form with plenty of sketches, photos, tables, graphs and problem solvers—is the information to help you analyze your problems, determine and select the kind, shape and size of Panelcoil for your heat transfer application.

Write for this valuable, free Bulletin.

DEAN PRODUCTS, INC.
1038 Dean Street, Brooklyn 38, N. Y.
STerling 9-5400
Backed by 25 years of Panel Coil Manufacturing

(Circle 3 in Readers' Service Dept.)

G. E. Engineers Working to Solve Echo Problem

Two space and communications engineers said recently that a technological skeleton left over from the steam locomotive era is haunting the space age and is causing controversy in discussions of how communication satellites should be floated.

The question concerns "time delay" or echo effect—a question answered nearly four decades ago in ground communication. According to two General Electric representatives, R. P. Haviland of the Missiles and Space Vehicles Department, and A. J. Vadasz of the Communication Products Department, the problem has been virtually rediscovered in research underway on relay satellites capable of handling world-wide long distance traffic.

The echo problem will exist, Vadasz said, where satellites are used in simultaneous two-way conversation over voice circuits. Due to the time necessary for a voice to travel to its destination and back to the person who is speaking, the returning message causes a perceivable echo. This may compel a speaker to talk at a slower rate, stutter, or to stop completely.

In wire line communications on earth, this problem was ironed out by echo suppressors as early as 1922. With the echo-suppressing technique, the voice line was attenuated in one direction while the lines carried speech in the opposite direction.

In space communications, Vadasz said, fewer satellites are needed for relay purposes when the orbit is at higher altitudes. However, he added, the height at which the satellite orbits has a direct effect on the degree to which an echo is perceptible. The higher the altitude, the longer the distance signal travels, the larger the time delay and the greater the echo. Engineers at G.E. are working to solve the problem.

Commission Proposed to Study Technology Problems

Representative Victor L. Anfuso of New York has proposed the creation of a special commission to conduct a study and investigation of methods for coordinating the engineering, scientific and technological programs of the United States. The Anfuso bill, H.R. 6349, cites the fact that various engineering and scientific activities of the Government are presently being conducted by many departments and agencies under various programs and authorities, with resulting inefficiency where the conduct of such activities involves duplication of effort or leaves gaps in areas urgently requiring developments.

To remedy this situation, Anfuso proposes that a nine-member Commission be appointed, each of whom shall be "a recognized scientist or engineer or a qualified expert in a field involved in or related to one or more of the scientific, technological, or engineering programs of the United States."

The Commission would be required to conduct its study and investigation and submit a final report within two years, after which it would cease to exist. The bill authorizes the Commission to employ staff assistants and to utilize the temporary services of experts and consultants at a per diem rate of $50.

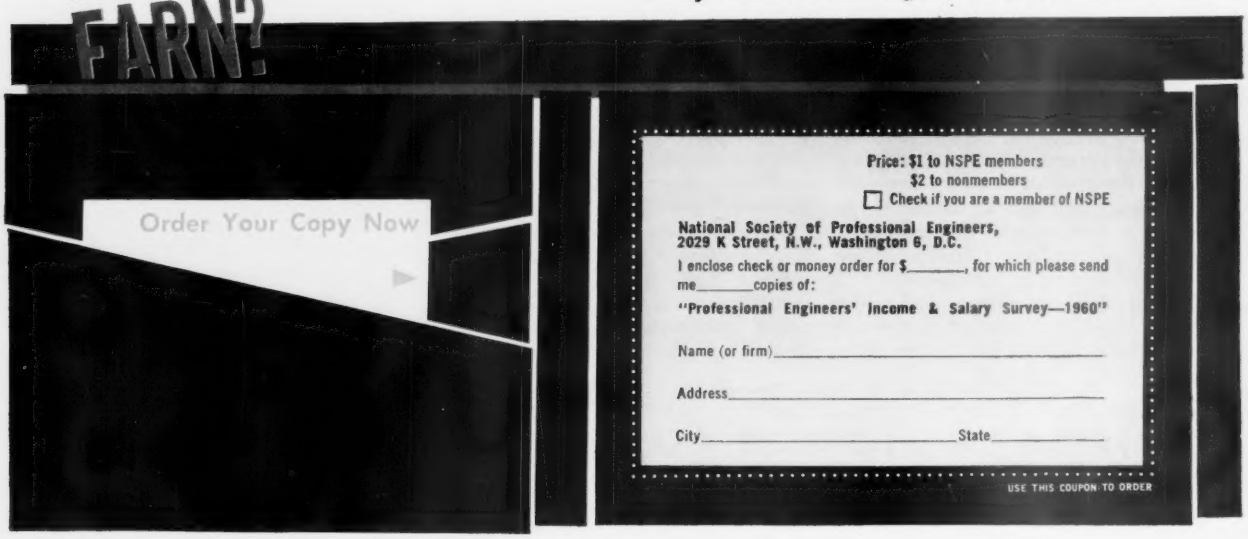
WHAT DOES A PROFESSIONAL ENGINEER EARN?

The National Society of Professional Engineers' latest **PROFESSIONAL ENGINEERS' INCOME & SALARY SURVEY** profiles the current engineering salary situation through a study of 24,000 registered engineers.

This 5th biennial survey in NSPE's long-range income and salary study program organizes survey data to present specific answers to such questions as:

- Which of the major engineering specialties has the highest median earnings?
- In what fields have professional engineers achieved the largest gains in total earnings over the period 1952–60?
- How do engineering salaries compare in the fields of education, public utilities, industry, government and private practice?
- How much, percentagewise, have engineer earnings increased throughout the country during the period 1952–60?

A detailed picture of engineer earnings by year of entry into the profession, by geographical region, by type of employer, by engineering specialty, and by other categories. Comparative earning figures from the 1952 through 1960 Surveys make it possible to evaluate broad engineering income and salary trends for an eight-year period.



Price: $1 to NSPE members
$2 to nonmembers
☐ **Check if you are a member of NSPE**

National Society of Professional Engineers,
2029 K Street, N.W., Washington 6, D.C.

I enclose check or money order for $_____, for which please send me_____copies of:

"Professional Engineers' Income & Salary Survey—1960"

Name (or firm)_____

Address_____

City_____State_____

USE THIS COUPON TO ORDER

Industry

New Salary System May Help UAW Boost Technical Unions

The United Auto Workers union is now laying plans to organize engineering and technical employees in the automotive industry hoping that Walter Reuther's plan to eliminate the hourly wage system will make their job easier.

Management, claims the UAW, has been using automation as a weapon to chip away at their traditional bargaining units. While every new production-increasing machine reduces the need for dues-paying production workers, it creates new positions for more highly trained, better paid, and secure white-collar employees.

These new employees, laments the union, know they are making income and benefit gains faster than production workers, and thus see no reason to join a shop-oriented union. Between 1950 and 1959, hourly paid production workers gained a median 53.4 per cent in income while salaried technical employees racked up a 68.3 per cent median gain.

Seeking to improve their image in the eyes of these more aspiring white-collar employees, the UAW now wants to rid itself of the low status hourly wage system altogether.

For mutual support on the new plan, several UAW technical and clerical local units have joined together to form the UAW "Engineering-Technical-Office Caucus." The long range aim of the new group is to organize engineering, technical and office employees, and their first goal is to get rid of the hourly wage system.

At a recent UAW collective bargaining convention, the Caucus distributed a four-page flyer entitled, "For Job Security, Convert Hourly to Salary." The obvious intent of the flyer was to gain support among UAW production elements for the pay system switch, and it strongly suggested that the only real reason white-collar employees are better off than production workers is because they receive a salary instead of hourly wages.

While apparently convinced of the logic of their new plan, the Caucus admits that the road to organizing engineers and technicians may not be a smooth one, and points to NSPE as a "roadblock."

The flyer quotes from the NSPE policy statement which offers assistance to engineering technicians who request help to prevent their unionization where it may adversely affect the performance of professional engineers.

"This is a typical example," says the union, "of some of the problems facing many engineering unions throughout the Nation in their efforts to organize the engineering technical and office workers."

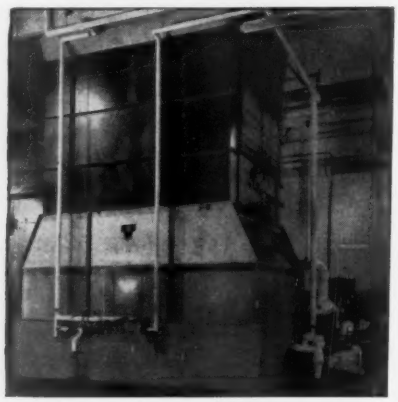
Older Engineers Should Continue Self-education

The reason starting rates creep up on salaries paid to more experienced engineers is because recent graduates are worth as much or more than many older men, says a Carnegie Institute professor.

Dr. Thomas Stelson, head of the civil engineering department of the Carnegie Institute of Technology, says in the April issue of *The Carnegie Alumnus* that unless engineers devote a considerable portion of their time to keeping

NIAGARA

Air-Cooled Heat Exchangers Bring You Extra Savings



Your Niagara Aero Heat Exchanger sets you free from dependence on a costly cooling water supply and solves the problem of water disposal. It pays for itself quickly and its long-lasting quality and dependability keep it constantly saving money for you and adding to your profit.

This Niagara design also saves you much labor and money in installation and upkeep. Its cleanable coils are easily accessible, as are all interior parts. Its panels are removable for cleaning and painting. It is easy and inexpensive to keep in "new machine" condition.

Niagara Aero Heat Exchangers have been making good records as revenue producers and cost savers for their owners for more than thirty years. Use them wherever you need to cool a liquid or a gas in industry.

Write for bulletins 120 and 132.

NIAGARA BLOWER COMPANY

Dept. AE-7, 405 Lexington Ave., New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

(Circle 4 in Readers' Service Dept.)

abreast of their fields, they quickly are left behind and lose their value to industrial employers.

Basing his estimate on changes in the Carnegie curriculum over the past ten years, Stelson said that an engineer who wants to increase his value at a reasonable rate has to devote about one-third of his productive hours to self-education and improvement.

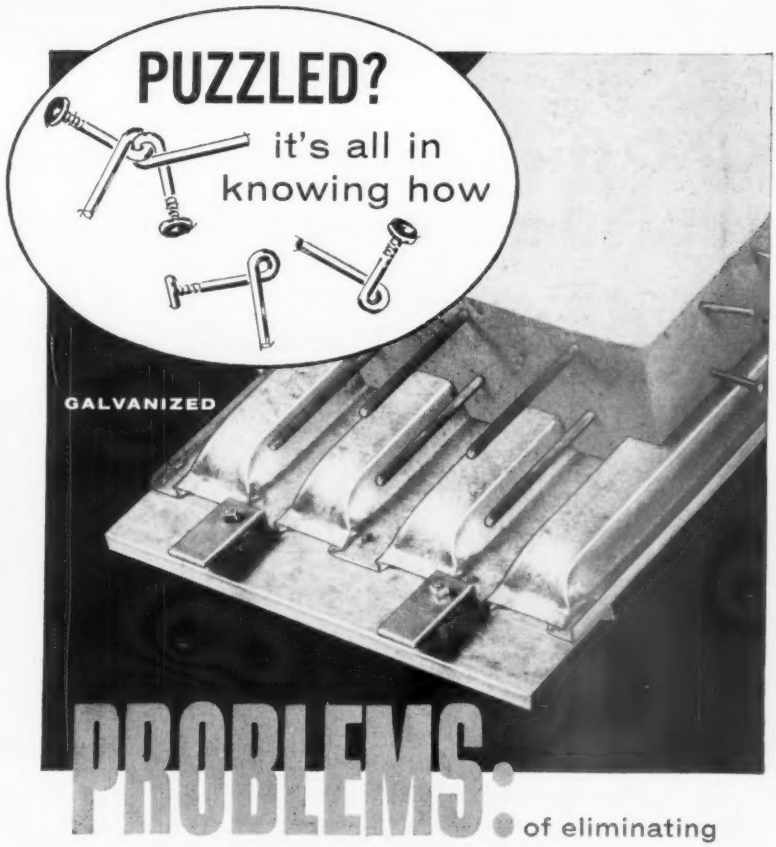
Noting that there are many individual cases where engineers wind up unemployed or working in subprofessional capacities because of obsolescence, Stelson thinks the situation is getting worse. "Such a trend implies that a new engineering graduate is near the peak of value to his employer and society, and that several years of experience may only add slightly to his professional stature," says Stelson.

The problem will get worse, he concludes, "unless professional societies, employers, and schools recognize its importance and develop suitable remedies." Stelson recommends improvements in undergraduate training, increased emphasis on graduate education, better on-the-job training, study leaves, and exchange of ideas through professional societies.

Concrete Bureau Ads Cite Registered Engineers

Recognizing the concern of potential buyers with sound and safe design, the Concrete Plant Manufacturers Bureau (CPMB) has recently begun a National advertising program stressing that design of structures is the responsibility of fulltime, registered engineers.

Composed of seven cooperating firms, CPMB designs and builds concrete plant equipment. The headline of one of CPMB's recent advertisements reads, "Concrete plant standards are *safety* standards, too." The body of the ad states in part ". . . you are assured that the design of your storage equipment has been the responsibility of a fulltime registered engineer, who is familiar with your particular local conditions, your building code requirements and such special factors as the incidence of hurricanes or earthquakes in your area."



PROBLEMS: of eliminating material waste, time delays, removal expense and hazardous operations on concrete bridge decks

ANSWERED BY: USF "leave-in-place" STEEL FORMS

Send for details to:
United Steel Fabricators, Inc., Wooster, Ohio

USF

Highway Guard Rail
Bridge Flooring
Steel Forms for Concrete Bridge Decks
Corrugated Metal Pipe
Window Wells
Metal Doors & Frames
Metal Buildings

(Circle 5 in Readers' Service Dept.)

GAO Highway Investigations Hit Estimated-cost Contracts

In two reports sent to Congress, Comptroller General Joseph Campbell has called for an end to per cent-of-cost interstate design contracts under the New Mexico highway department, and has given a close look at the "major" reliance upon private firms for highway design in the District of Columbia.

In a review of the Federal-aid Highway Program in the states of New Mexico and Wyoming, the General Accounting Office expressed displeasure with New Mexico's extensive use of straight per cent-of-estimated-construction-cost design contracts. Pointing out that this type of contract awards engineering fees on the basis of estimated rather than actual contract costs, the report noted that in 36 out of 42 contracts examined, eventual low bids were less than engineers' estimates. In 24 cases the low bids were more than 15 per cent below estimates.

The GAO report viewed such contract procedure as "not conducive to reasonable control of costs and fees," and said they were undesirable whether based on actual or estimated costs. "It is our view," said the report, "that the amount of the fee should be dependent upon such factors as the technical competence required and the extent and complexity of the work to be performed and should not vary with the cost of construction of a project."

In a separate review of the District of Columbia interstate highway program, the GAO softened their previous stand on the District's use of consulting engineers. In testimony before a House Appropriations subcommittee last year, GAO officials were highly critical of the use of consultants on the road program, and cited the District as an example of states whose use of consultants violated Federal laws and regulations. In the latest report, however, while implying that they are still doubtful about the practice, the GAO makes no direct statement to the effect that the District's policy violates any Federal law or regulation. The report pegs District spending for consultants between November, 1956, and March, 1959, at about $7,772,000, but this time takes note that District officials give good reasons for their policy. District officials stated they had not expanded their staff because of the shortage of qualified engineering personnel, and because the area of the District is not large enough to warrant a large permanent staff to handle the above normal requirements of the construction program.

House Passes HR 10 with Nearly Unanimous Vote

By a voice vote which was practically unanimous, the House for the third time has approved legislation to aid the self-employed in establishing retirement programs. The measure came before the House under a suspension of the rules which required a two-thirds affirmative vote for passage.

The bill approved by the House is similar in objective to its predecessors, but differs somewhat in detail. In general, the measure treats self-employed individuals as employees for the purpose of extending to them some of the tax benefits that present law provides for retirement programs established by corporate employers for their employees. They would be permitted to deduct limited amounts set aside under retirement plans for their own benefit, as well as amounts set aside for the benefit of their employees. Sums set aside would not be taxed until a distribution is received upon retirement, or otherwise.

Self-employed persons who have less than four regular employees could establish retirement plans solely for themselves and defer up to ten per cent of their self-employment earnings, or $2500, whichever is the lesser, for amounts set aside to provide for their future retirement. Such persons may, but are not required to, set up a retirement plan for their employees.

However, those self-employed who have more than three employees, could not set up a retirement plan for themselves unless they also provide vested benefits for all of their regular employees who have three or more years of service. If such a plan is established, the ratio of the contribution made on their own behalf cannot exceed the ratio of contributions to compensation set aside for employees. This is another way of saying the plan cannot discriminate in favor of the self-employed employer.

New House Bill Would Limit Gov't Competition

A bill introduced by Representative Ostertag of New York would limit the activities of the Federal

PROFESSIONAL LIABILITY INSURANCE
for ENGINEERS

AS COMMENDED BY THE BOARD OF DIRECTORS OF THE NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

VICTOR O. SCHINNERER & COMPANY, INC.
Professional Liability Specialists for Architects and Engineers, 1131 Investment Building, Washington 5, D.C.

(Circle 6 in Readers' Service Dept.)

Government in certain cases where they are in competition with private business enterprises.

Known as the "Anti-Government-Competition Act," H.R. 2919 would establish as the policy of the Federal Government the proposition that private competitive enterprise should be encouraged to the maximum extent consistent with national security and the public interest, and that within this limitation, all business type activities engaged in by the Federal Government to the detriment of private business enterprises should be terminated.

The bill further provides that any Federal department, agency, or instrumentality wishing to engage in any business-type activity which is available commercially would have to obtain special permission from the President of the United States.

Recent Court Decisions Clear Architect, Engineer

The Supreme Court of Louisiana has reversed the decisions of two lower courts and held that an architect was not negligent when a worker was killed in a boiler explosion caused by lack of a relief valve.

The two previous lower court decisions had held that the architect's failure to get engineering approval of a subcontractor's shop drawings of a domestic hot water system constituted negligence. The shop drawings did not include the safety valve, and the lower courts ruled that when the architect approved them thus, he was negligent. In addition, the lower courts ruled the architect negligent for his failure to inspect the hot water system as it was being installed.

The Supreme Court, however, said that the inspection clause in the contract was intended to "insure to the owner that before final acceptance of the work the building would be completed in accordance with the plans and specifications," and that the architect "had no duty to supervise the contractor's method of doing the work."

In addition, the approval of the subcontractor's shop drawings, a key point in the lower court decisions, was ruled to be only an approval for the subcontractor to place orders for equipment. The terms of the contract said the specifications still must be met, regardless of the shop drawings, and the specifications clearly provided for a relief valve.

A California appeals court has ruled that an engineer who surveyed a subdivision, and established permanent markers, is entitled to a lien on the property.

The engineer surveyed, planned and mapped the property for subdivision, prepared a subdivision map for recording, and constructed permanent markers and monuments. Although the map prepared by the engineer was on the local town council's agenda for consideration, the owner failed to post the required bond, the map was never approved, and no further work was done on the subdivision.

The engineer began an action to foreclose a mechanic's lien for his services, which was upheld by the lower court. The owners appealed the lower court's decision, saying that California law requires that a "work of improvement" be constructed before a lien can be established. They argued that since no bond was posted and the map not approved, no subsequent "improvement" of the land took place. The work of the engineer, they contended, did not in itself constitute the required "improvement."

The court ruled, however, that the permanent monuments set up by the engineer constituted a "work of improvement," which was essential to the over-all "scheme of improvement" set forth in the California statute. The court also held that failure to post bond was the fault of the owner rather than the engineer, and was thus no defense against a lien. (*Day v. National U.S. Radiator Corporation*, No. 45059, Supreme Court of Louisiana, and *Nolte v. Cusack*, No. 18716, District One, Division One, District Court of Appeal of the State of California.)

ELECTRONIC • PRINTED CIRCUIT • GRAPHIC

SYMBOLS

MADE TO ORDER

Repetitive symbols . . . in fact *any* drafting, blueprint or specification detail items . . . can be *applied* in seconds, rather than *drawn* in hours. If your engineers or draftsmen haven't yet discovered the speed and economy of STANPAT, they are wasting valuable hours . . . and valuable money.

STANPAT tri-acetate sheets are quickly and easily adhered to your tracings without special equipment. Reproductions are crisp and clean . . . Won't dry out, come off or wrinkle. Mail the coupon today and see for yourself.

pre-printed • tri-acetate

STANPAT sheets

Used by more than 30 industries

STANPAT CO., Whitestone 57, N. Y.
Phone: FLushing 9-1693-1611 Dept. 82
☐ Please quote on enclosed samples 11-15-60
☐ Kindly send literature and samples 11-17
Name
Title
Company
Address
City State

(Circle 7 in Readers' Service Dept.)

Now Available . . .

THE ENGINEER IN STATE GOVERNMENT

A Study of Merit System Coverage and Personnel Policies

Here, for the first time, is a comprehensive analysis of merit system coverage and personnel policies affecting engineers employed by state governments. Information in the report is based on detailed replies to a direct questionnaire solicitation from state personnel officials with the cooperation of state engineering societies.

"The Engineer in State Government" contains a number of tables which show, by state—

- Applicability of merit principles
- Policies on registration
- Policies on advanced education
- Policies on professional society participation

NOTE THESE CHAPTER HEADINGS—

- Coverage of Engineers by Merit or Civil Service Systems
- Registration Requirements and Policies
- Occupational Titles and Grade Levels
- Educational and Experience Requirements
- Educational Opportunities
- Professional Society Participation

Prepared and published by

THE FUNCTIONAL SECTION FOR ENGINEERS IN GOVERNMENT PRACTICE

National Society of Professional Engineers

Price: $1.00 per copy
NSPE Members: .50 per copy

National Society of Professional Engineers
2029 K Street, N.W., Washington 6, D. C.

Please send me .....cop(y)(ies) of
THE ENGINEER IN STATE GOVERNMENT

I enclose check in the amount of $.....

Name .....

Address .....

City ..... Zone .... State .....

(Make checks payable to NSPE)

$1.00 per copy
.50 to NSPE members

☐ Check if your are a member of NSPE

Macy Charges Engineers to Improve and Protect Society

Civil Service Commission Chairman John W. Macy, Jr., speaking at the D. C. Society's Silver Anniversary meeting, called on the engineering profession "to concentrate on improvement, rather than protection, of the breed to meet your broader responsibilities to society and to contribute to the solution of grave National problems." Macy urged his listeners specifically to: (1) Stimulate more young people to enter the engineering field and assure them of opportunities for career preparation; (2) improve and modernize engineering curricula; (3) raise professional standards while at the same time recognizing the overlapping of disciplines in this modern technological era; and (4) improve the utilization of engineers to help meet critical manpower needs in the 60's.

Discussing the responsibilities of the Commission to improve personnel management for engineers and scientists, the CSC chairman cited a number of accomplishments that have been made within recent years. One relatively new concept, he said, is the program whereby higher quality college graduates in professional fields are eligible for original appointment at GS-7, two grades and $1000 higher than the regular career entry portal. In addition, this quality program has been extended to research and development positions, including many in engineering, in which graduate study is desirable. For quality graduate students, the Commission has authorized appointment of one year master's candidates at GS-9, two year master's candidates at GS-11, and Ph.D's at GS-12.

Macy challenged as "shabby folklore" the widely held opinion that the only avenue to higher level Federal jobs is to become a supervisor or administrator. "The classification grade-level standards for nonsupervisory engineering positions, published in 1959, offer positive proof that vigorous steps have been taken to provide avenues for advancement of engineers in nonsupervisory assignments," he said. On the other hand, he acknowledged that the Commission must offer more opportunities for engineers who have been entirely concerned with technical problems and decisions to acquire administrative and management know-how to broaden their horizons of career thinking beyond the confines of the immediate job.

With respect to the perennial and knotty problems involving the proper classification of engineering positions, Macy pointed out a number of developments which he said have helped enhance the profession and improved the career situation for engineers. These include a recognition of the professional reputation and status of engineers in research fields and recognition of the impact of the incumbent on the kind and level of work he does. Also, Macy said that the language of classification standards has been improved so that they are more meaningful to those in the profession concerned. "For the first time," he added, "we feel that we are starting to view professional occupations and the difficulty and responsibility factors inherent in them in the same light as persons in the profession view them."

One of the major areas of engineering personnel relations in which there has been a notable lack of significant progress, Macy reported, is the pay problem. Provision for higher minimum pay in the grade is not the ultimate answer, even though helpful, he admitted. The CSC Chairman reported that while the Government can pay for moving newly hired engineers to their first post of duty, authority is lacking for paying candidates' travel expenses in reporting for interviews.

On the basis of Macy's informative talk and his statement that "we welcome your help and cooperation," plans are being made for NSPE representatives to meet informally with the CSC chairman in order to discuss several pending items of interest to Federally-employed engineers. Among these will be the bills in Congress to establish a separate classification and pay system for engineers and physical scientists, engineering classification procedures and job standards, and the reported Executive Order dealing with recognition of Federal employee unions.

"And to think of all the money we wasted on those multimillion dollar missiles."

House Bill Will Raise Per Diem Travel Rates

The House has passed and sent to the Senate a bill to increase the maximum per diem travel allowance rates for Federal employees and to increase the mileage allowance when privately owned vehicles are used on Government business. The bill was introduced by Rep. Kathryn E. Granahan of Pennsylvania (H.R. 3279).

The measure would raise the

maximum per diem allowance from its present rate of $12 per day to $16 per day, and would increase to twelve cents per mile the present ten-cent allowance for the use of privately owned automobiles on official business. Other provisions of the bill would increase to $30 from its present $25 the maximum allowance for official travelers authorized to be paid on an actual expense basis, and would authorize the payment to employees of parking fees incurred while using privately owned vehicles for official purposes.

Senate O. K.'s Assistant Secretary for Science

The Senate has approved a bill to establish the office of Assistant Secretary of Commerce for Science and Technology. The bill was introduced at the request of Commerce Secretary Luther H. Hodges who cited the need for competent direction and administration of the Department's scientific and technical programs, and the need for an effective review of its expanding science activities by a highly qualified science administrator.

Included within the Commerce Department are such scientifically-oriented agencies as the National Bureau of Standards, the Weather Bureau, the Coast and Geodetic Survey, the Patent Office and the Office of Technical Services. In addition, the responsibilities of the Bureau of Public Roads and the Maritime Administration, Hodges said, require extensive research and development activities in a number of scientific and technical fields.

International Group Goes to Work on Ohio Highways

A group of twenty-nine highway engineers representing ten different nations has begun a 16-week study in administrative and laboratory operations in the Ohio Department of Highways. The program is being conducted under the sponsorship of the International Cooperation Administration, working through the U. S. Bureau of Public Roads. The engineers participating in the program are representatives of China, Colombia, India, Indonesia, Japan, Jordan, Korea, Spain, Thailand and Vietnam.

The Ohio Highway Department is placing these engineers in various departments and assigning them to work in such areas as bridge design, construction, planning, traffic, maintenance and hydraulics. In carrying out their assignments, the foreign engineers will work along with regular engineers of the Department.

Upon return to their home countries, they will generally move up into positions of supervisory responsibility. The program is expected to conclude around the middle of September.

Bureau of Reclamation Publishes Career Booklet

James K. Carr, P.E., Under Secretary of the Interior, has announced publication by the Bureau of Reclamation of an illustrated brochure outlining many opportunities for engineering careers with that organization. The booklet has been prepared primarily to acquaint college engineering students, their faculty counselors and college placement officers with the Bureau's program, its organization and its potential as a future employer.

Floyd E. Dominy, Reclamation commissioner, said that because of the breadth and variety of its operations, "a career with the Bureau offers the young engineer a continuing professional challenge and unusual opportunity for growth." He added that the young engineer who begins a career with the Bureau "is associating himself with a dynamic organization which plans, designs, builds and operates water and land conservation projects in the Western United States."

At the present there are about 2000 professional engineers on the Bureau of Reclamation staff. These engineers, located primarily in the western states, represent almost all phases of the engineering profession, from civil, mechanical, chemical, electrical, structural and architectural to engineering geology. The engineers are augmented by an additional 3000 scientific and technical employees.

NSPE Moves Quickly Regarding Executive Order

Reports of a proposed Presidential Executive Order which presumably would grant official recognition to Federal employee unions for purposes of representation and collective bargaining have drawn a prompt comment from NSPE, in order to protect the rights of professional employees.

In letters to Arthur J. Goldberg, secretary of labor, and John W. Macy, Jr., chairman of the Civil Service Commission, NSPE urged that any official authority given to Federal employee organizations for the expression of the views of their members relative to agency personnel policies should be phrased in terms so as to permit this privilege to all organizations, including professional societies. "It should not be confined exclusively to so-called unions of Federal employees or labor organizations."

NSPE also suggested that the proposed Executive Order be worded to provide for a secret ballot election to determine employee views on representation, and that "professional level employees be given a separate choice to determine their wishes regarding unit placement with nonprofessional employees." In this regard, NSPE offered the comment that the professional employee provisions of the Taft-Hartley Act be considered in drafting the proposed Executive Order.

AE Meetings of Note

National Association of Power Engineers—National Convention, July 17-21, Sheraton-Gibson Hotel, Cincinnati, Ohio.

American Astronautical Society—Annual West Coast Meeting — August, Palo Alto, California.

Society of Automotive Engineers—National West Coast Meeting—August 14-17, Sheraton Hotel, Portland, Oregon.

American Rocket Society—Biennial Gas Dynamics Symposium—August 23-25, Northwestern University, Evanston, Illinois.

National Council of State Boards of Engineering Examiners—Annual Meeting—August 23-26, University of Kentucky, Lexington, Kentucky.

American Society of Mechanical Engineers — International Conference on Heat Transfer—August 28-September 1, Boulder, Colorado.

UCLA Develops Curriculum for Engineers of the Future

The engineer of the future will have to develop vast and complex machines and systems in fields which are unknown today—and he is probably not getting the education to equip him for the job.

This is the opinion of Dr. Allen B. Rosenstein of the UCLA engineering department's Educational Development Program. The Program, supported by a $1,200,000 grant from the Ford Foundation, is an intensive, five-year study of the UCLA engineering curriculum and of the whole state of present and future engineering education.

"As an undergraduate, the engineering student gets a heavy dose of basic science, and as a graduate he concentrates on research mainly in mathematics and the physical sciences. The big hole in his education is in the discipline of design," Dr. Rosenstein believes. "A design project may range all the way from developing a better pencil sharpener or weapons system, to meeting the problems of air pollution, salt water conversion, or public transportation."

"Only through a highly developed design skill," Dr. Rosenstein adds, "can the engineer rise above the narrow specialties and tackle problems in vast and yet uncharted fields."

To fit the future engineer with these skills, a group of UCLA engineering professors are investigating design as a key part of their department's Educational Development Program.

Currently, the EDP planners visualize design as the binding force in a seven-year engineering curriculum, starting at the freshman level and continuing as a major graduate field through the doctoral degree. To investigate the parts that might go into such a curriculum, the design group will start six research projects during the current year.

Projects are planned in the following areas:

- Organizing and Transmitting Information—the first step in any design problem and one that is lagging seriously behind our strides in producing new information.
- Engineering Value Systems—Human values, though frequently neglected in engineering training, are the basic guidelines in any design project. For instance, says Dr. Rosenstein, our entire public and private transportation system would be completely changed if the current value of human life, as gauged by insurance rates and awards, were to be rated 100 times greater than now.
- Synthesis Techniques, including methods for determining the feasibility and reliability of any engineering system.
- Optimization Techniques. Finding ways to develop a machine or system to its optimum level is the particular responsibility of the engineer, which should be organized into a formal body of knowledge.
- Decision Making. Design has been called a continuous and repetitive decision-making process, so that research in the mechanics and rules of decision-making is fundamental in understanding the overall design problem.
- Design with Computers. Computers are becoming one of the major tools of the engineer, and can be used to great advantage in the design field.

"At the present time, most so-called engineering research is actually concerned with scientific problems," says Dr. Rosenstein. "Through our six projects, we will for the first time, broach a research area which deals with the fundamental and characteristic problems of engineering itself."

AIIE Seeks Research in Industrial Engineering

Once a year the Research Information Subcommittee of the American Institute of Industrial Engineers requests that research sources submit research performed in the area of Industrial Engineering. Sources from which information will be solicited are universities, industrial organizations, research institutions, and nonprofit organizations, including government agencies and professional societies. These research abstracts are published annually and provide a valuable service to both industry and universities.

Research abstracts are to be collected in the areas of:

Work measurement, methods, facility planning, applied psychology, engineering economics, organization planning, materials processing, production planning and control, data processing systems design, applied mathematics, costs and cost control, industrial engineering education.

The committee will appreciate all information on Industrial Engineering research, past and present, about which it might gather abstracts. Dr. Jay Goldman of the Department of Industrial Engineering at Washington University, Saint Louis, Missouri, is serving as chairman.

Growth Industries Needed to Shape Future Economy

Communities that want "growth industries" will have to provide the graduate educational facilities these industries need to grow on, a leading U.S. educator-engineer said recently at Sterling Forest, N. Y.

It is the growth industries which will shape our future economy and standard of living "more than anything else," in the opinion of Dr. Frederick E. Terman, pro-

MORT CLARK'S **GALV-WELD** ALLOY ORIGINAL & GENUINE

Withstood 3389 hr. Gov't. salt spray test—25 years field exposure. Eliminates bolts and rivets, specify for pipe joints, Galv., structures, tanks, ducts, cold storage and packing plants, drains, washers, towers, steel bldgs., repairing skips. **GALV-WELD PRODUCTS, Dept. AE-3, P. O. Box 1303, Bradenton, Florida.**

(Circle 8 in Readers' Service Dept)

vost and vice-president of Stanford University, at the opening session of a Symposium on Research and the Community, sponsored by New York State's Advisory Council for the Advancement of Industrial Research and Development.

The Stanford leader described growth industries as those "based on exploitation of new developments in science and technology—electronics, nucleonics, missiles, computers, chemicals, pharmaceuticals, and the like." Growth industry is a postwar phenomenon which developed out of the vastly expanded research effort, he pointed out. The research began as a requirement for military preparedness, but now is recognized as an investment in the future.

"Universities are sources of highly trained young men, the most important raw material going into creative work, and through their research activities, universities are sources of ideas. The university faculty in science and engineering represents a panel of experts of widely diverse skills. These experts are available on a consulting basis to aid industry with its problems, and on such terms that even a relatively small company can afford them. A university close at hand also provides employees with educational opportunities for advancement and keeping abreast of new scientific developments.

"Finally, the university creates an atmosphere that stimulates creativity and makes a community attractive to scientifically minded individuals." Such considerations were responsible for the development of large centers of growth industries around Harvard and MIT in the Boston area, around Caltech at Pasadena, and near Stanford at Palo Alto, he said. Educational institutions, in turn, gain much by being near a center of creative industry, he said. "The flow of ideas goes both ways.

"Again, as applied to this community, the ceiling for its potential as a center for creative work is going to be set by the graduate educational opportunities it can develop rather than by the work of architects and urban planners."

University of Wisconsin Approves New Curriculum

The University of Wisconsin faculty recently approved a new curriculum leading to the degree of bachelor of science, nuclear engineering.

Undergraduate students as well as graduate students will be able to study nuclear engineering in the UW College of Engineering beginning next fall. Under the new curriculum, from 40 to 44 per cent of the student's studies will be in the basic sciences, also 40 to 44 per cent in engineering, and from 16 to 20 per cent in non-technical courses.

The UW College of Engineering's nuclear engineering program was started three years ago for graduate students only, granting master of science degrees only during its first two years. The program was enlarged a year ago to grant also Ph.D. degrees.

Engineering and Education

The following statement was prepared by a committee of the School of Engineering of Massachusetts Institute of Technology.

Engineering is a profession. Its members do creative work which results in things that people need or want. These things may be highways, submarines, interplanetary vehicles, antibiotics, or television. Science, on the other hand, is a search for knowledge. The science of mathematics extends abstract knowledge. The science of physics extends organized knowledge of the physical world. In each of these, considerations can be limited to a carefully isolated aspect of reality.

The engineer must deal with reality in all its aspects. He must not only be competent to use the most classical and the most modern parts of science, but he must be able to devise and make a product which will be used by people. Moreover, he must assume professional responsibility insofar as the safety and well-being of people are affected by the thing he makes.

A sound program which majors in engineering or one of its branches—civil, mechanical, chemical, etc.—will be the most stimulating and rewarding undergraduate experience for the great majority of candidates for engineering. They will find in it not only the science of the modern physicist, but also the other kinds of science—for example, fluid mechanics, or electric-circuit theory—which the engineer uses and develops as incisive means for resolving the complex problems of the real world. Such a program grows out of an educational environment created by men in contact with the world of people and industry which serves the people. It will include attention to the furtherance of many parts of science which are of special interest to the engineer.

Engineering education is being urgently called upon to produce graduates well versed in rapidly advancing science who will lead industry and the public into the new world which engineering will make possible. Engineers will often discover in science through their own research and invention or through the findings of scientists those things which can be put to human use. In any engineering achievement, however, the thing produced is the objective, and all means available to the intellect of man will be employed to reach that objective. Science and its application remain a part, but only a part, of any great engineering advance. Supersonic aircraft could have been devised and made only by engineers with great resources in science. In order to make the first supersonic airplane, however, science had to be combined with the engineer's drive toward creation of a predetermined object. Young people who can respond to this kind of challenge are needed now, but they will be needed as never before in the years ahead.

Strictly Business

Personalities . . . **Amandus Leo** will retire as dean of the School of Engineering at **Manhattan College** at the end of the present academic year . . . **Austin H. Lange** has joined the architectural firm **Baker-Lange** as a partner . . . **Public Health Service** has announced the appointment of **Robert E. Novick** as regional program director for engineering services in the Denver, Colo., regional office of HEW . . . **Bettenburg, Townsend, Stolte and Comb,** St. Paul, Minn., has announced four new partners: **Edward F. Kishel, William J. Estebo, Robert L. Pope,** and **Marvin Bruce** . . . **Evan A. Edwards** has been named assistant director of the film services division of the **Kodak Park Works** of **Eastman Kodak Company** . . . **Harvey J. Field, Jr.,** has been named district engineer of the **Portland Cement Association's** Vancouver, B.C., district office . . . **Clinton J. Starke** has been appointed as central district sales manager of the Dapon Department of **Food Machinery and Chemical Corporation** . . . The appointment of **Marsden C. Smith** as consultant has been announced by **Whitman, Requardt and Associates** . . . The **Department of Health, Education and Welfare** has appointed **Herbert C. Clare** to represent the department on the Missouri Basin Inter-Agency Committee.

Dean Leo

James C. Bollerhey has been appointed superintendent of steel mill erection of the **David W. Murray Co.** . . . **H. E. Bovay, Jr., Consulting Engineers** has announced the appointment of **L. S. Curtis** as manager of the Baton Rouge, La., office . . . **General Electric Company** announces the appointment of **Herman F. Zaiss, Jr.** as manager-engineering support for the Traveling Wave Tube Product Section . . . **William T. Davis** has been appointed supervisor of manufacturing engineering for **Air Reduction Sales Company** . . . **Electronic Communications, Inc.** announced the election of **Samuel W. Bishop** as president . . . **James M. Cloney** has been appointed general manager of the Ozalid Division of **General Aniline & Film Corp.** . . . **Robertshaw Fulton** has named **Arthur G. Baitz** as assistant vice president of the firm's Eastern Research Center at King of Prussia, Pa. . . . **Charles P. Weisz** has been appointed structural engineer for the **Wire Reinforcement Institute** . . . The appointment of **Charles L. Allen** as president of **International Fermont Machinery Co.** was announced recently.

Mr. Bollerhey

Professor **Robert P. Witt** has been named a special staff consultant to the Topographic Division of the **U. S. Geological Survey** . . . **International Resistance Co.** has announced the appointment of **James C. Alemanni** as manufacturing engineer . . . **Joseph Rosenthal,** president of **Engineers Inc.,** Newark, N.J., announced recently the merger of the firm with Julius Berger, formerly located in Florham Park, N.J. . . . **Ralph L. Brown** joins the staff at **Lenkurt Electric Co., Inc.,** San Carlos, Calif. . . . The appointment of **Donald E. Young** as assistant vice president-general of **Burroughs Corporation** was announced recently . . . **Dynex Industries, Inc.,** has announced the appointment of **Michel Mamon** as vice president in charge of engineering . . . **Hydro-Pneu-Tronics, Inc.,** Cleveland, Ohio, has announced the appointment of **Marvin R. Stein** as sales manager for the **Force Transducer** sales div. . . . **Norval L. Platt** has announced the opening of an office in Binghamton, N. Y. . . . **John H. Wickham, Jr.,** was recently appointed executive director of the **Association of Professional Photogrammetrists** . . . H. A. Boas, Jr., vice president, marketing, of the **Budd Company** announced recently the appointment of **William H. Hartley** as manager, market research.

Mr. Witt

Clarence A. Dauber has been appointed to head the thermal power engineering activities of **Chas. T. Main, Inc.,** of Boston, Mass. . . . **Philco Corporation's** Government and Industrial Group of Philadelphia has named **H. Edward Rice** as vice president-operations . . . **W. A. Irvine** has been elected president of the **Metal Powder Industries,** Newton, Iowa . . . **Dean Johansen** was recently promoted to the position of head of materials, **Engineered Electronics Company,** Santa Ana, Calif. . . . Dr. Haldon A. Leedy announced recently the appointment of **Dr. James L. Wyatt** as vice president for program development at the **Armour Research Foundation of Illinois Institute of Technology** . . . **Dean M. Cleaveland** was recently elected president of the **American Society of Lubrication Engineers** . . . **W. G. Scharnberger** was recently elected president of the **Permanent Magnet Producers Association** of Chicago, Ill. . . . Board of Directors of the **American Zinc Institute** have elected **F. R. Jeffrey** as president . . . **Fuller Company** has announced the appointment of **Harry A. Markle, Jr.** as director of engineering.

Mr. Dauber

HERE'S HOW BORDEN FLOOR GRATING CUTS COSTLY FIELD CORRECTIONS...

Insures correct dimensions, fit, and placement...

1. A shop drawing of the job is submitted to the customer for approval, when necessary. This plan shows the size and shape of the grating area—how grating clears all obstructions.
2. Each finished panel is carefully checked for accuracy of dimensions.
3. Each panel is plainly marked with its number to insure quick, easy installation.
4. The entire platform is laid out on our shop floor. Over-all dimensions and obstruction openings are checked against shop drawings.
5. Erection diagram showing panel mark numbers is supplied for field installation.

Write today for FREE 16-page catalog showing all basic types of grating; more than 30 dimensional drawings of sub-types; eight safe load tables for steel and aluminum grating.

BORDEN METAL PRODUCTS CO.

"Greatest name in gratings"

953 GREEN LANE ELizabeth 2-6410 ELIZABETH, N.J.

Plants at: UNION, N.J.; LEEDS, ALA.; CONROE, TEX.; BEETON, ONT.

BORDEN METAL PRODUCTS CO.

Gentlemen:

Please send me NEW 1961 BORDEN Catalog

Name .....

Title .....

Company Name .....

St. and No. .....

City and State .....

(Circle 9 in Readers' Service Dept.)

The Engineering Union— Dinosaur in the Space Age

"Professional" engineers at RCA's Camden plant exemplify one approach to management-engineer relations during a six-day strike a year ago. The strike ended only after the arrest of seven engineers.

In the past ten years, engineering unions have failed time and time again when faced with a test at the polls. Why is this true? Apparently because they simply don't offer the engineer more than he can achieve through a professional approach to his relations with industrial management. This article presents the issues at stake.

WESTERN Electric engineers vote resoundingly for "no union," in a national election representing nearly 7,000 engineering employees.

At Minneapolis-Honeywell Regulator Co., engineers and technicians choose "no union," in preference to both UAW representation and representation by an all-engineer/scientist bargaining unit.

Engineers and Scientists of America, a Federation theoretically banding together engineering unions in a national alliance, slips quietly out of business.

Engineers and technicians at Sperry Gyroscope Company in a decertification election vote 1724 to 1509 against the union which has represented them for fourteen years.

Since 1952—nearly ten years—no major group of engineers has indicated that they wanted union representation. Where there have been elections, with any significant number of engineers involved, the vote has been consistently "no union."

In a profession comprised of some half a million registered and nonregistered engineers, less than ten per cent – under 50,000 – are currently represented by collective bargaining units. In regard to these, the comment of one former union executive is significant: "With one possible exception, I think any of these groups could be crushed by management in a matter of weeks. For the one exception, the only difference is the amount of time it would take. By and large, all of these units exist at the sufferance of management, and for that reason alone."

Certainly the foregoing suggests a fairly clear trend. The obvious implication is that the engineering union is going the way of the Dodo and the Great Auk, slowly but inevitably into extinction. Why is

this so? There are probably several basic reasons that could be applied in general, and there are also specific reasons that have come up in connection with specific instances of union rejection.

The most fundamental reason that engineering unions are vanishing seems to be simply that they don't offer the individual engineer enough in the way of benefits to make them worth his while. From a professional standpoint, certainly the engineering union is in direct opposition to the individual's interests. From an economic standpoint, there seems to be no reasonable indication that union membership improves the position of the individual engineer. In terms of such intangibles as prestige, harmony in working relationships, and intracompany communications, there seems to be a tendency on the part of unions to work directly against the interests of the individual engineer.

Harold A. Mosher, P.E., past president of National Society of Professional Engineers, sums up the situation this way: "We think it is fair to say that the advancement of the welfare of engineers employed in industry through the union method has been given a fair trial and has been found wanting. In more recent years, the union approach has been rejected in virtually every known case in which the engineers had a full and free choice."

One former union man's comments reflect the same feeling in regard to the Western Electric election. "The biggest single factor we had working against us was that many engineers who voted didn't think the union was powerful enough to do more for them than they could do for themselves." The union in question was the Council of Western Electric Professional Employees—National, and when it was defeated, it was eminently clear that the engineers who had voted had done two things. First, they had realigned themselves with the vast majority of professionally oriented engineers in the Nation. Second, they had dealt a serious, and perhaps fatal, blow to the only national association of engineering and scientific unions as such—Engineers and Scientists of America.

Perhaps *coup de grace* would be a better term, for since its founding in 1952, ESA steadily lost members and affiliates until it quietly went out of business last winter. In many ways the dissolution of ESA is symbolic of the decline of engineering unionism in the past decade, for steadily and surely the unions have lost ground in practically every situation where they have been put to a test.

AT first glance, it would seem paradoxical that during this same time period, the engineering profession has in fact come into its own —for this implies a directly inverse proportion between the strength of the profession and the strength of its unions. However, this is exactly the case. Given the impetus of exploding technology in the past ten to twenty years, the engineering profession, as a profession, is stronger than it has ever been. It has achieved this position through professional methods, and putting the paradox in its proper perspective it is little wonder that engineering unions simply don't offer the individual engineer enough to justify themselves.

THERE is one other basic factor connected with the explosion of technology that bears directly on the engineering unionism question. This is the growing reliance that industrial management places on the engineer, and the resultant responsibility accruing to the engineer. Perhaps more than ever before the engineer must necessarily be a part of the management team and accept the professional status that is implied in this position. Where in the past management placed reliance on the comptroller, the production specialist or the sales/marketing functions to produce profits, the technological nature of today's economy has placed this responsibility on the engineer. More and more, management includes strong, top level engineering representation, to maintain a competitive position, they simply must.

The result of this situation is perhaps best summed up by NSPE Past President Mosher: "The engineer in industry wants an opportunity to share in and be a part of the company, to know what the company is doing, how they are working toward their goals, and what his responsibilities and prospects are in that plan. In short, the engineer in industry wants to be a part of the team, not an outsider looking in. For this purpose, the engineer in industry wants the opportunity to earn the confidence and respect of his employer, and to

International Association of Machinists Lodge 1420 sign contract with Technifax Corp., in Holyoke, Mass. Do such union contracts make adequate recognition of individual excellence?

Egg-throwing and snake-dancing marred the six-day strike of RCA engineers, shown here. Picketing engineers failed to coerce RCA management into meeting their demands through these tactics.

deserve a place on the team, not to be a part of an opposing group which wants to lick the team of which he is a member." More pointedly, it is probably true that from a professional standpoint, the engineer has an obligation to accept the foregoing as his responsibility, for if he does not, there is the definite chance of his falling short of professional fulfillment on his job.

"Professionalism" and "unionism" are certainly general and relatively abstract terms. In an actual election situation, does the engineer make his decision on such an idealistic plane? Apparently, the answer is "yes," particularly if the engineer chooses in favor of professionalism. It is interesting to contrast two opinions on the matter, particularly in the light of the positions of those commenting. A member of the decertification committee at Minneapolis-Honeywell states categorically, "The decision here was in favor of professionalism, as abstract as that may seem. The idea of union membership on the opposite side of the ballot was rejected as unionism, and I think it would be very difficult to accurately narrow the reasons for the vote down much more than that."

On the other hand, take the comments of one union worker: "It's been said that simply setting up a good employee insurance program would make the difference in many cases." Perhaps the best measure of who is right is the results that have come in at the polls in the past. There can be little question that one of the basic mistakes that has been made by the unions in the past is their failure to realize that they are dealing with people who are a notch above the production worker in terms of education, professional concepts and general sophistication.

Take the comments of Jack Barbash, now a labor economist with University of Wisconsin, and formerly with AFL-CIO: "Once the white collar worker gets over the initial trauma of being in a union, he behaves like a bricklayer." Referring to the Air Line Pilots Association, Barbash continues: "What are they doing? They are engaging in jurisdictional disputes with the flight engineers—an old weapon in Detroit and other places . . . they are calling quickie strikes and wholesale strikes. In short, they are behaving like trade unionists."

Even assuming that these pilots qualify as professionals under the Taft-Hartley definitions (an unlikely assumption in the light of NLRB case decisions) their degree of true professional awareness and responsibility is not founded in the same way as is the case for doctors, lawyers or engineers. And whether or not behaving "like a bricklayer" is a legitimate aspiration of professional responsibility would also seem open to question.

Another indication of the union approach is offered by picking a pair of quotes from *Engineering News,* published by International Union of Electrical, Radio and Machine Workers, AFL-CIO, District 4:

"It is not American wage rates which are putting American manufacturers at a competitive disadvantage, but excessive executive salaries, says Cameron Hawley, industrialist-turned-novelist. . . ."

Or "Professional and technical unions . . . are the only means of providing the protection which allows an engineer to place his conscience and public trust above his loyalty to his employer—the only mark of a real professional. . . ."

The first quote is a blatant example of the "management bogeyman" approach to union organization. It seems strange that so naive an argument would be used as a tool to sway professional men towards unionism, and yet this is one of the unions' favorite devices.

The second quote is a clear implication that some ninety-plus per cent of the American engineering profession are unable to "place confidence and trust above . . . loyalty to . . . employer." In addition to being outright distortion, it again implies a healthy amount of naïveté on the part of the person it is supposed to influence.

PERHAPS one result of this sort of an approach to the organization of engineering unions is best summed up by a former union official who worked closely with the Western Electric election. "You would be surprised how much trouble we had with wives who simply were against having their husbands in unions. For many people there is a sort of stigma attached to union membership."

Certainly there are broader factors that work in this same direction. If the end of rampant monopolistic big business came with the rise of unionism and the trust-

busting actions in the early part of this century, it is probably true that unions are facing much of the same thing at the present time. The most obvious example of this is, of course, the McClellan hearings regarding Jimmy Hoffa's Teamsters. Rightly or wrongly, this sort of exposé must necessarily create a bad picture of unionism as a whole in many people's eyes. Whether or not the "management bogeyman" approach is the best way to counteract this sort of an impression seems to be worth a good bit of analysis.

Certainly a strong case could be made for the fact that the unions have never really put forth an organized and concerted National effort to create strong engineering unions. As an AFL-CIO official points out, "There are other white collar areas which we consider more important, and more immediately profitable." A good measure of the divisiveness involved is shown in an IUE comment on the demise of ESA. Commented an IUE newspaper, "Doomed from the beginning by its self-imposed isolation from the rest of the American labor movement, ESA was dissolved. . . ."

On the one hand, ESA's approach was slanted to a "professional union," whether or not this appears to be a contradiction in terms. The union attitude is summed up by Everett M. Kassalow, research director of the AFL-CIO Industrial Union Department. "I am convinced that one reason why some of the white collar engineering unions of the past decade collapsed was their failure to develop among their members a clear-cut acceptance that a union must act and regard itself as a union. Attempts to cover this with the notion that the organization is of a purely professional character and/or an arm of management will not stand up in the long run before aggressive management." Kassalow's conclusion is that stronger maintenance and production unions will eventually be the source of any successful organizing of engineers.

But the facts of the matter are that neither approach seems to be palatable to the engineer; both have failed when put to the test of an election. Ironically, the underlying reason for this failure is contained in Kassalow's words: "Whether it calls itself a 'professional' group or not, a union is a union, and as such is rejected by the professionally oriented engineer." If this is true, as it certainly appears to be, the eventual hope of evolving a foundation for engineering unionism from the production and maintenance labor organizations seems remote indeed. Having stated so unequivocally their feelings regarding quasi-professional organizations such as ESA, it seems more than remote that engineers would allow themselves to be amalgamated with production and maintenance employees in unions dominated by nonprofessionals.

In a 1959 convention, the United Auto Workers, AFL-CIO made this sweeping statement: "Organizing engineers, technicians and office workers is the most essential organizing task facing the trade union movement in the United States and Canada now and in the years ahead. . . ." The basic reason for such a statement is that the ratio of white- to blue-collar workers is steadily increasing. The unions offer other arguments along the same lines. They point to the ever-increasing concentrations of engineering talent in single companies, and point to the impossibility of each individual engineer being able to demand enough of management time to state his individual case. They point to the dependence of engineers on ever-changing defense contracts, and the wholesale layoffs which can result in such situations. They indicate that median age for engineers in the Nation is low—about 32—and say that many engineers, because of their relative youth consider themselves headed for managerial positions, when in fact they are not.

Happier days in union-management relations at Western Air Lines are shown in contract signing ceremony. Recent strike of Flight Engineers International Association, Inc. ended with management trying to fire all striking "engineers" who refused to return to work.

Certainly, as is true in any profession or other line of work, the engineer must face a fair amount of economic instability and a less than secure future. And in a strong, national, wholly professional organization, there obviously will be protection for the engineer, individually and as a member of a profession. As other professions have proven, such a system can work most effectively.

(Continued on page 57)

FROM WASHINGTON

BY
MILTON F. LUNCH,
N.S.P.E.'s Legislative Counsel

Unions on Unemployment ►

In the face of clear evidence that the priority demands in the Nation's work force for the future will be in the area of professional-technical employees, the AFL-CIO is continuing its campaign to undercut the portion of the National Defense Education Act which provides Federal educational assistance in occupations requiring scientific or technical knowledge. In recent testimony before a House Education Subcommittee on the extension and revision of the NDEA, an AFL-CIO witness urged removal of the reference to scientific and technical knowledge in the authorization. The union witness said the funds should be available "for the training of individuals designed to fit them for useful employment as technicians or skilled workers in fields necessary for National defense or economic well-being."

Substantive changes in the Federal program will not be made this year, pending the appointment of a special committee by the Secretary of Health, Education and Welfare to study the broad question of Federal programs for vocational training assistance as related to the present emphasis on workers to meet the needs of a technological age. As pointed out in a recent study by the Committee for Economic Development, "Distressed Areas In A Growing Economy," between 1950 and 1960, professional technical and kindred workers increased 54.1 per cent, while craftsmen, foremen and kindred workers increased only 7.2 per cent. According to Department of Labor estimates, this trend will accelerate in the next decade. The CED study suggests that additional Federal financial assistance for vocational training in distressed localities is needed, and that qualified students should be permitted to take vocational training away from home when it is not available locally. A Senate Subcommittee on Employment and Manpower has held hearings on legislation authorizing the retraining of persons displaced from their jobs by automation or changes in the structure of the economy. Meanwhile, Labor Secretary Goldberg has completed organization of an Advisory Committee on Automation and Manpower to study employment and unemployment and develop programs for training and placing workers affected by automation.

◄ Proposals for Public Planning

The Administration has recommended amendments to the Advance Planning Law to make area-wide projects eligible for Federal public works planning advances where construction might require a number of years. Such assistance would be available for aid in financing the cost of plans for area-wide sewer, highway, or transit facilities embracing an entire metropolitan or regional area and for campus planning of educational institutions, the actual construction of which may be phased over a number of years. Through the end of March, 1961, a total of 1,710 applications for $40.8 million had been approved under the 1954 advance planning law. The estimate cost of the projects aided by these public works planning advances total over $2.5 billion.

Federal Freeways? ►

Stinging criticism of the policies and practices of the Bureau of Public Roads with regard to inspection of projects in the interstate highway system has been voiced by the House Special Subcommittee on the Federal-Aid Highway Program in connection with the Oklahoma highway scandal. In a second interim report on highway construction practices in Oklahoma, the majority wrestles with the Federal-state relationship and concludes that the Federal agency has an obligation to make inspections at all stages of construction to insure compliance with all terms of the contract. A five-man minority protests this conclusion, however, and claims that the majority report implies that the highway program should be "federalized." The basic issue, the minority says, is whether to abandon the long standing practice of the BPR relying upon the integrity and good faith of the officials of the state who certify to the Federal Government that the roads have been constructed in accordance with both state and Federal standards. The minority also protests that the majority position would mean Federal duplication of all local control and inspections. Three members of the majority, in supplemental views in the report, then rebut the minority comments and vigorously deny any inference in the report favoring nationalization of the interstate highway program. The supplemental comment says there is agreement that the states should have the primary responsibility of planning and building and supervising construction of the roads, and that BPR's function is to administer the program. "But we are impelled to the observation that the Bureau of Public Roads, in the Oklahoma case at least, is in the embarrassing position of having been caught with its administrative trousers suspended at half-mast." The whole crux of the matter, it is added, is in the requirement of the existing law that the Secretary of Commerce be satisfied that each state has a highway department suitably equipped and organized to carry out the functions required by the law. "It seems to us, in the light of the evidence before us, that the Secretary of Commerce also has the duty to make sure that his Bureau of Public Roads is suitably equipped and organized to carry out its functions and that includes the prompt detection of any wrong doing anywhere in connection with the Federal-aid highway program. As we see it, this is what the majority report meant when it called for a reevaluation of current procedures at both the State and Federal levels."

◄ Shunning the Shelters

President Kennedy's proposal to provide shelters from radioactive fallout in new Federal buildings is not faring too well in Congress. The House has defeated a request for a $1.2 million shelter in the proposed new White House office building. Rep. John F. Baldwin of California, who sought to add the funds, said that citizens cannot be expected to take fall out shelters seriously when the Government ignores them. The House Appropriations Committee has also eliminated $2 million for small shelters in 29 different locations and a pilot project to provide a "Federal example" in the shelter program. Following the House action, Frank B. Ellis, director of the Office of Civil and Defense Mobilization, said he was "alarmed not only by the adverse effect of this action on the Nation-wide Shelter Program, but more importantly, on the effort to create a National mood of urgency consonant with the perils of our age." He said he hoped "this impulse of the moment" will be reconsidered in final Congressional action. Meanwhile, OCDM announced that President Kennedy had given approval for the construction of the Nation's first regional federal underground command post in Denton, Texas. The center will cost approximately $3 million and will house the operations of OCDM Region Five. The underground headquarters in Denton is the first of eight planned throughout the country.

The Pursuit of Excellence

A nation involved in a race for space, striving for world-wide prestige, advancing in technological know-how to a degree never before achieved, should pay serious attention to developing an educational system that will enable tomorrow's generations to support and build on today's accomplishments.

By

PROF. PAUL J. GROGAN, P.E.

University of Wisconsin Extension Division

NEVER in the history of the world have people been so prosperous, yet so concerned about costs; so well educated, yet so short of qualified manpower; so justifiably proud of their past accomplishments, yet so rightly concerned about the future. To coin a phrase, "Never before in American history have so many felt such grave concern about so much."

What are the forces afoot? What are the solutions to our dilemma? What can we do about the future to make our lives more meaningful and our families more secure from serious harm?

The answers to these and other equally important and disturbing questions are tied up in the social, economic and political affairs of our country. And more, too, the answers lie in part in the troubled culture or anti-culture of America. It would appear that the history of America is being written in terms of a host of creature-comfort devices around the house that have failed to live up to their promises but are equalled in their ridiculousness by the finned and plated bodies of j u n k e d automobiles stacked in the pasturelands of the countryside to the everlasting bafflement of the cows that graze there.

Now, these are scarcely s a f e areas for an engineer or an engineering educator to t r e a d. But engineers and educators, the same as any other people, wish to know the answers to these disturbing questions. As we try to trace our way through the labyrinth we must be willing to share in the responsibility for the causes, just as we hope to share in some of the uncertain rewards of the future.

October 4, 1957, is branded almost as indelibly on the American conscience as that day of infamy, December 7, 1941. The more recent date marked the bloodless launching of Sputnik I while the earlier historic date, as we all know, marked the launching of World War II against American Forces at Pearl Harbor and in the Philippines. Why is it that a few strident beeps from a Russian radio circling our globe in a tin moon caused us to flip our collective National lid nearly as much as the 3,000 dead at Pearl Harbor some 16 years earlier?

In my mind, there are two answers to that question. One is the comeuppance, the i n s u l t, the shock that a nation of backward people would dare to flaunt their strength before the might of America. After all, didn't we carry Russia through World War II with our lend lease? Didn't we perfect the A-bomb only to lose our secrets through some security mistakes made by the typically bungling British? Didn't we, and not the Russians, as they so ridiculously claim, invent the reaper, the telegraph, radio, television, the airplane, and a host of other modern innovations and c o n v e n i e n c e s? Didn't we have a practical corner on the world's automobiles, bathtubs, telephones, charcoal broilers, beauty queens and athletes?

The other reason for our double take at S p u t n i k I was centered around a feeling of National guilt. I say guilt rather than embarrassment, but it was really guilt with embarrassment thrown in for good measure. Our guilt complex arises from gnawing doubts with respect to our assumed position of world leadership. If a power could throw several hundred pounds of metal clear around the world in 90 minutes, there to cycle indefinitely, could it not throw a ton or more of potent warhead to any particular spot on the globe? The only difference between October 4 and December 7 was in the immediate vital statistics. The threat to our National security was the same in each instance. We lost four battleships at Pearl Harbor. We lost more than that three years ago when the space age was thrust upon us before we were fully prepared.

The guilt of which I speak did not hit us, or at least collective America, in one sudden flush of realization. Rather, it has been creeping upon us slowly but surely at high levels and in educated circles. Every time we become engrossed in one of our sundry National pasttimes, subconsciously thinking this *thing* will surely go away, the Soviet throws something bigger farther into space, much as an impatient teacher snaps her fingers to again command Johnny's attention.

Our own progress in the space race has been fantastic when you recall that radar is scarcely twenty years old. But how did we get into the rumble seat instead of behind the wheel? And are we going along for the ride or are we being taken for a ride after the patented Chicago gangland fashion?

The need for better education only grows stronger as technological developments progress.

The period since the end of World War II has seen a tremendous upheaval of political alignments and potentials for world power around the globe. This has been taking place without significant gunfire. New dynamic forces are at work. The number of great powers has changed from a pre-war six or eight to a post-war two. Germany, Japan, Italy, France and Great Britain have declined considerably from their former positions as great powers. Russia and the United States have emerged as the nations of major importance in the balance of power. It is well for us to question what other ways the balance of power has shifted, and where it is likely to go. China is emerging as a new nation aligned with Russia as an ideological companion on the continent of Asia. In this same part of the globe India will gain power and strength, or at least be heard, as a free and independent population of over 350 million must. Nehru's insistence on neutrality works to the advantage of the predators afoot in Asia.

The industrial revolution was born in England of Anglo-Saxon parents and grew to manhood in the United States, but the long lead given us by our industrial strength has vanished. In fact such smugness or complacency can lead to our downfall. The hydrogen bomb in the hands of an unscrupulous political schemer can lead quickly to a common disaster. While we feel the burden of past wars and have tried to repair the damage done to the world's economy, brash opportunists can quickly stockpile the wherewithal to render us incapable of producing the barest industrial necessities for waging *peace,* let alone *war.*

WE should think seriously for a moment about the recent course of history in Great Britain. Here is our staunch ally of two world wars, and the forebearer who has exerted the greatest influence on the course of United States' history. But the world no longer runs on sailing ships and worsteds and tweeds. The number and caliber of Navy guns and their distribution around the globe no longer carries significant weight in the ministries of the world. Before England there were France and Spain, Carthage and Rome, Greece and Phoenicia, Egypt and Babylon; yes, even China and the Ganghis Khan flourished and then faded in the Far East. We should reflect on this for a moment. Is there a law of growth and decay of nations? We read it has happened in the past. Do we expect it to happen in the future?

Must there be decline where there is *quality*? How can there be decline if we exhort ourselves to maintain and strengthen the leadership we have demonstrated throughout the Twentieth Century? But we cannot deal with the ordinary. American consumer goods once were admired and accepted the world over, but today's American consumer goods can be duplicated the world over, at least equal in quality and well below our price. We have to apply ourselves to some form of leadership other than mass production. Transistors, computers and automation; guidance systems, inertial navigation and space craft; nuclear energy, solar energy and fuel cells; new metals, plastics and polymers; new systems, improved methods and processes; all come to mind as fields worthy of our thought and effort. The industrialization of Russia, China, India and Egypt is moving apace today. We should welcome this opportunity for the other peoples of the world to enjoy a measure of our living standard. We can offset this new found strength among unfriendly nations by moving ahead rapidly and surely into new fields. Our products of the future thus become more complex. We must depend more and more upon the unique contributions of engineering science and technology, and less and less upon the endless repetition of the craftsman and the assembly line.

There is no hope for America in terms of manpower. Russia outnumbers us by 50-odd millions. Moreover, a great many Russian women do the work of men. China and India each outnumber us several times over. Our position in world leadership demands that we develop *all* of our talent to its full-

est capability. We can no longer depend upon an elite class to discover new things and reduce them to practice. Past generations have always produced their men of genius from Archimedes to Einstein, but the majority of men who have lived in the past have done nothing more noteworthy than to tend sheep. We need a great many more Edisons, Ketterings, Tellers, Neumans, Langmuirs and Salks in the future. Now is the time for redeployment of our resources, both human and material, to meet the challenge of the second half of the Twentieth Century.

To paraphrase the slogans of two large electrical manufacturers, "You can be sure if it's progress!" We should all strive to be more like Kettering who always said, "I have faith in the future; I plan to spend the rest of my life there."

ONCE a speaker from the Hotpoint Division of General Electric Company addressed a group of seniors about to graduate from The University of Wisconsin. His general theme was along the lines of career development. As his closing point he told the group he would give them *one word* that would be the secret to their success—a word none of them could guess. Although many tried to match his word with *work, honesty, loyalty, perseverance, luck, integrity* and so on, he waved off all of their suggestions. The word, he said, was *reputation*. He expanded; not reputation in the social or moral sense, but reputation as a performer and a doer within your profession. A reputation that will cause your name to come to the forefront when someone is sought to perform a certain difficult task. If you accept these opportunities in succession, doing your best on each, your progress will exceed your greatest expectations.

Actually, your development solves two problems: (1) It solves your personal problem of adequate financial reward; and (2) it solves a part of our National need for improved technical and leadership qualifications in many fields. On every hand, we are beset with shortages of experienced personnel. I would be unfair to confine that shortage to a single area such as education, engineering or management alone. The sciences, law, medicine, the ministery, public service and the world of business, all suffer today from similar shortages. It follows directly from our technological progress. The lad who formerly set pins in the neighborhood bowling alley now designs, installs and services the modern electronic marvel – the automatic pin spotter. A boy flying a kite on a hillside 15 or 20 years ago now crosses the Atlantic Ocean in a jet airplane between principal meals of the day. The youngster thrilled with a spring-wound motor in an erector set of 25 years ago, now ponders the use of liquid metals and 5,000 pounds per square inch pressure as economical attributes of modern power plant equipment. Such radical advances are not confined to engineering. The youngster fashioning a splint on a lame dog in the days of the depression now moves in and out of human hearts with deft fingers adding useful years to the lives of many.

Out of self respect, we must admit that today's commercial, financial, industrial and transportation complex is in good hands, but who is to assume the responsibility in a few short years? Is our present bubble gum and comic book brigade aware of the terrible responsibility we are preparing for them? They will not begin with low compression ratio and low horsepower engines. Theirs will be the problems of nuclear reactors, rocket systems, 300-ton aircraft, and transportation time tables as intricately detailed as today's watches. Maybe our younger generation actually needs the flights of fancy provided by the comic books to prepare themselves for the complexities that lie ahead. Every man will have to play a similar responsible role. Mail will travel by rockets and land with postage stamp accuracy. Air liners with hundreds of passengers will race ahead of the sun while traveling great distances without refueling. Our best minds will engage the complicated design and material problems of the future. Ordinary skills for maintenance and operation of such precision systems will call for technical competence far beyond that which is available today.

We have cited some of the problems that will be a part of our future formal education programs. These will be the province of governmental agencies and administrative officials in our school systems. The broad gauge solution of such problems lies in expanding the base of our educational programs on all fronts.

What can you and I do about our mutual problems? We can accomplish a lot simply by paying attention to the byways as well as the highways in our efforts to improve local educational patterns. Our educational programs should consider the individuals on either side of the main core of students pursuing higher learning. Attention should be given to: (1) The young, the hopeful, who one day must reach out for knowledge, who seek a future in an exciting profession; (2) the mature, the practical experienced who, even today, seek greater technical competence for the heavier responsibilities thrust upon them, and who, tomorrow, must face the threat of being rendered obsolete by an automated technology that will not wait for the slow of hand, eye or wit.

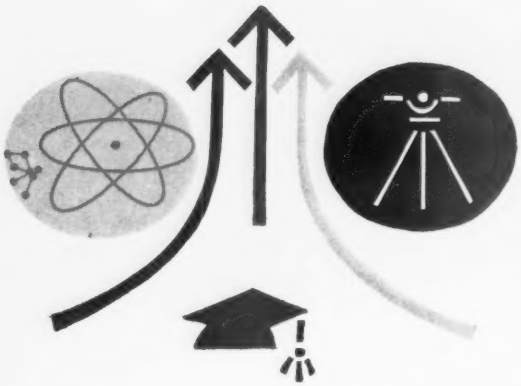
(Continued on page 57)

About the Author . . .

Prof. Grogan

Professor Paul J. Grogan, P.E., has been chairman of the University of Wisconsin Extension Division Department of Engineering since 1951, and has served six years as director of engineering institutes in his department. He graduated from Purdue University in mechanical engineering and received his master's from UW. Following World War II, Grogan taught four years in the UW College of Engineering and one year at the University of Notre Dame. He is a member of ASME, Wisconsin SPE, American Society for Engineering Education, National Association of Power Engineers, American Society of Tool Engineers and the Wisconsin Council of Safety.

Professional Profiles



Homer H. Grant, P.E., associate dean of the School of Engineering at University of Southern California, has found that one of the most firm foundations for a successful career is a broad variety of interests and experiences.

One of the best yardsticks for measuring professional achievement is probably the breadth of interests of the individual. By this measure, there are probably few men who can stand next to Homer H. Grant, P.E., associate dean of the School of Engineering at the University of Southern California, president and controlling stockholder of Climax Manufacturing Co., member of the California Board of Transportation Rate Experts of the Los Angeles Board of Education, and an active consultant to such worthy companies as General Electric, Stanford Research Institute, and the Los Angeles Metropolitan Transit Authority.

Industry, education, government and consulting—the list of jobs looks like a rundown of the engineering profession itself. Not a man to be confined, Dean Grant set a precedent for himself when, at the age of 15, he constructed his own radio equipment which allowed him to communicate halfway around the world.

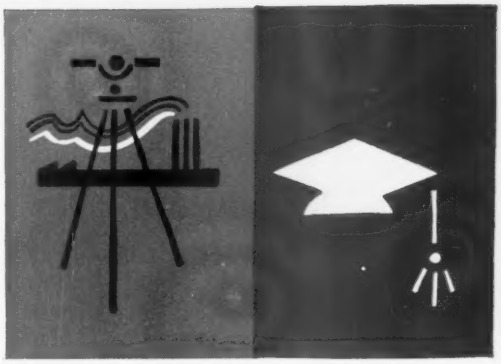
From that beginning in his technical career, Dean Grant began his steady—if sometimes less than direct—climb to his present position. Among the milestones: MS in EE from University of Washington in 1933; with Western Union, a telegraph operator in 24 cities and manager in 15; ten years in charge of research for the Washington and California public utility commissions and other governmental bodies; professor of Industrial Engineering, University of Southern California.

As assistant to the vice president and general manager and transportation engineer for the Key System, Oakland, Calif., Dean Grant was a key figure in a successful World War II effort of that organization to carry some 120-million people per year using manpower and equipment for a normal capacity of less than 60-million. At USC, he is head of the Department of Industrial Engineering, and acting head of the Department of Electrical Engineering.

A registered P.E. for some 25 years, Dean Grant is equally active in his professional activities. A former California Society of Professional Engineers state director, Dean Grant is alert to changes in the status of the profession, and has spoken and written extensively on such matters as the current public confusion between science and engineering.

Besides his NSPE membership, Dean Grant is affiliated with American Institute of Industrial Engineers, American Institute of Electrical Engineers and Tau Beta Pi. He was recently named engineer of the month by the *Engineer of Southern California*, following his nomination for that honor by the American Institute of Industrial Engineers.

ENGINEERING AND THE LEARNED PROFESSIONS



By
WILLIAM LURIE
U.S. Naval Weapons Plant, Washington, D.C.

READING the comments by Admiral Rickover on "The Meaning of Your Profession" one begins to ask the question:

"Has engineering, as a profession, attained the status of theology, law, medicine or teaching?" and, as one reads what Admiral Rickover has to say, the answer to the question appears to be, "Not yet." In his recent articles Admiral Rickover presents some reasons for engineering's not being on the same professional level as the "learned professions," and indicates some means of improving the professional status of engineering. It is my purpose to attempt to explore the fundamental ideas behind both the reasons for engineering's present status, and the means for improvement.

First, let us review what Admiral Rickover says. In examining the current status of engineering, he states that the basic and traditional rules of conduct (of a profession) are the duty to maintain professional independence by rejecting lay direction in the performance of professional work, and the obligation to use professional knowledge and techniques solely for the client's benefit. However, he continues, since engineering is a newcomer among the learned professions, its ideals and principles are not yet firmly fixed, and the engineer has more difficulty in maintaining his professional independence than, say, a physician employed by the same organization. "The difference," he says, "lies in the determination of the medical profession to brook no lay interference. The engineering profession does not yet resist lay interference with equal ardor. Toward the physician, the layman is suitably humble in matters medical. Not so, as yet, toward the engineer."

The consequence, just described, of the lack of firmness of the principles of the engineering profession, can be compared with the evidence of the presence and firmness of principle in the "learned professions." As to theology—"Clergymen of all faiths have shown great courage in resisting the attempts of ruthless governments to dictate to them in matters of church administration. These are part of the clergyman's profession—if I may use the term—in which he cannot brook lay control." As to teaching (and its correlative, scholarship) ". . . academic freedom, which is the term applied to the professional freedom of the scholar and the scientist to pursue knowledge wherever it may lead him, even if it leads to conclusions which are politically unpopular." As to medicine, in addition to the previous comments on the independence of the medical profession, "[The Greeks] formulated the ethics of this profession in the famed Oath of Hippocrates, which we have not been able to improve upon." And as to law, the engineer is exhorted to "consider himself an 'officer of the court' and keep the general interest always in mind." Here, then, we have evidence of firmly formulated principles of the four "learned professions," formulations and the adherence thereto which engineering has apparently not yet been able to achieve.

Why is it, then, that the "learned professions" have been able to accomplish this achievement, and not yet engineering? It is here proposed that the "learned professions" are conscious of three elements in their history, that these three elements have, one might say, clearly marked out the road toward this achievement and prevented straying from that road, and that the engineering profession is not yet conscious of these elements.

What, then, are these elements? They are: An ideal, to which the profession is devoted; an institution, dedicated to the practice and fostering of the ideal; and inspirers, men associated with the institution, men who can serve as models in their devotion to the ideal.

For theology (insofar as it is directed to things of this earth) the ideal has been love, in its largest sense; the institution, the church, again in its largest sense; and the inspirers, the prophets, the saints, the founders of religious groups who established the institutions through which the ideal was made manifest.

For law: The ideal—justice; the institution—the court, through which the ideal of justice attains realization; the inspirers—those men of law who devoted their thoughts and actions and lives to upholding the ideal.

For medicine: The ideal—health; the institution—the hospital in its broadest sense (i.e., the doctor-

(Continued on page 59)

AE Special Section

Professional Devel

On the following seven pages American Engineer reports on three different programs of professional development for engineers in industry which have proved highly effective in improving the situation and status of engineers working in the three places involved. Programs of the two divisions of General Electric which won for them NSPE's 1961 award for industrial professional development are discussed here, and there follows a report on how the Quaker Oats Company extensively revised their program for engineers.

FORWARD-looking engineering employment practices in the instrument and transformer centers of the General Electric Company have won for the two G. E. units the 1961 Industrial Professional Development Award of the National Society of Professional Engineers.

The second annual Award winners, selected by a five-member NSPE Industrial Award Committee, were chosen on the basis of engineering professional development policies and programs at the Transformer Division in Pittsfield, Massachusetts, and at the Instrument Department in West Lynn, in the same state.

Engraved plaques will be presented to representatives of the two G. E. units at a luncheon session of the NSPE annual meeting in Seattle, July 7.

The winners were selected for the Award from nominations submitted by NSPE's state societies. The state groups made the nominations from lists of firms submitted by local chapters. The Committee made its choice primarily after a consideration of engineering employment practices relating to: Registration; education and technical training; technical and professional society membership; engineers as authors; professional working conditions; utilization; engineering titles; engineer-management communications; indoctrination programs; salary plans; merit review programs; and job evaluation systems.

An analysis of the professional development policies at the two engineering centers suggests the scope of the over-all engineering-management program in this area which has evolved at the two locations. These policies at both Pittsfield and West Lynn point up the significance of the management statement that "Professional development is in reality a proposition of self-development. Self-development, however, can be encouraged and rewarded by the proper policies and procedures to create a climate for professional growth."

The Transformer Division at Pittsfield has well over 400 engineers engaged in such areas as large power transformers, apparatus transformers, voltage regulators, high voltage bushings, distribution and network transformers, lightning arresters, and cutouts. The engineering work in these departments includes development, design, manufacture and marketing of the above mentioned products.

Three general company policies have particular significance for Transformer Division engineers. These are the Salary Administration Plan, Parallel Paths of Advancement, and Company-Wide Opportunity for Advancement.

Local association of engineers has provided a means for members to advance their professional and social status through various programs of service. A new set of officers of the Pittsfield General Electric Engineers Association takes over the sounding-board type of organization.

opment in Industry

Winners of the 1961 NSPE Award for Professional Development in Industry:

General Electric Transformer Division, Pittsfield, Mass.
General Electric Instrument Divison, West Lynn, Mass.

At the Transformer Division engineers may take advantage of classroom instruction in the use of equipment to speed up reading skills.

Library research facilities are available at the Transformer Division for the use of engineers in writing papers for publication as well as in their work.

Approximately 79 per cent of the Transformer Division engineers are either registered or have applied for registration. The company offers a refresher course for registration examinations, provides time off with pay for engineers to take the registration exams, provides frames for registration certificates, makes department communication channels available to publicly recognize new registrants, and indicates registration status on personnel records.

Educational opportunity is offered to Transformer engineers through company courses, university courses, and company training programs. Specialized courses given in the company range from technical Russian to electric utility systems. General development courses include such subjects as speed reading, sales analysis, finance, professional business management, and effective presentation. Full or partial tuition and the cost of books is paid by the company for graduate courses in local schools. Engineers are currently working toward master and doctorate degrees under this program. Leaves of absence and financial assistance to promising employees are given for full time graduate work.

Company training programs for engineers at Pittsfield are entitled Engineering, Manufacturing Training, and Technical Marketing. Each is basically a three-year, on-the-job training program supplemented by specialized courses.

Community activities are suggested to the individual engineer as developmental tools. Participation in such activities is encouraged, and recorded in personnel records. Some of the community activities suggested include career guidance talks at high schools, service in speakers bureaus, service on local school boards, instructing in high school technical courses, and service as counselor for company sponsored Junior Achievement Organizations.

Membership in technical and professional societies at the local, state, and National levels is encouraged by the engineering management. Eighty per cent of the Transformer Division engineers and scientists are members of such societies as AIEE, ASME, ACS, AIChE, etc. More than 40 per cent of the registered engineers are

General Electric Instrument Department engineers discussing their graduate work with Dean W. T. Alexander of nearby Northeastern University.

members of NSPE. About 80 per cent are members of the Pittsfield General Electric Engineer's Association. Many society activities are held on company time. Notices of meetings, awards, and other items of interest to engineering personnel are reproduced by the company and distributed through the internal mail system. Active participation in society affairs at the National level is aided by company payment of traveling and other expenses.

Engineers may prepare technical papers on company time concerning original work done as part of their regular duties. Publication of technical papers in a field not connected with the normal duties of the engineer is neither encouraged nor discouraged. Publication of papers on professional questions is encouraged, and the company pays expenses for an engineer who has a technical paper accepted for presentation to a meeting of a society of which he is a member. More than 80 papers were written and presented in a recent one-year period.

Transformer engineers do not punch time clocks, are given clerical assistance, are located in individual offices or small groups, are listed in company telephone directories, have trained technicians or draftsmen available to assist or carry on nonprofessional aspects of their work, and have technical library facilities at hand.

General Electric people at Pittsfield and Lynn feel that engineering professional development has been given a sizable boost by making available high speed electronic computers for routine engineering design work. The Transformer Division views the use of computers for engineering as a six-fold benefit:

(1.) The engineering profession has been upgraded. In freeing the engineer from dull, routine mathematical computations, the computer gives him time for creative thinking.

(2.) Whereas in precomputer days, 70 per cent of the total engineering time was spent on making routine design computations and 30 per cent on creative work, today approximately 70 per cent of the engineering effort is directed toward development.

(3.) Design work has been upgraded, since only the most complicated designs are done by hand. Engineering design is more challenging as a result.

A typical G.E. Instrument Department office shows design engineers working in conditions that are conducive to both individual effort and team work.

(4.) Design studies by computers allow the engineer to study a whole range of design parameters quickly and easily. This enables him to improve on the quality of his practices and design work, and to optimize for cost and performance. The improved practices are then incorporated into the design programs and benefit every design thereafter.

(5.) Engineers can now be made available for effective contributions in other fields such as product research, market analysis, product planning, and manufacturing.

(6.) The computer helps to relieve a shortage of experienced technical manpower by concentrating the available manpower on the development of the product.

At the GE Instrument Department in West Lynn, a total of 177 engineers are employed. Electric instruments and measurement systems are manufactured at this location for commercial and military applications. Among the product lines are switchboard and recording instruments, process instruments, aircraft engine and aircraft navigation instruments and systems, nuclear reactor control instrumentation, and specialty testing instruments such as halogen-type and mass spectrometer leak detectors.

The Department has 86 per cent of the engineers who are eligible for registration in the position of either being registered or having applications pending for registration. Engineers are informed by management that registration is one of several important measures of an engineer's professional standing. Twenty of the 23 engineering managers are registered. The latter assist engineers in applying for registration by providing application blanks, instructions, photographs, and notary services. A record of an engineer's registration is added to his personnel portfolio and is considered along with his other accomplishments when his performance is appraised, his salary is reviewed, or his qualifications for promotion are determined.

Sixty-two per cent of the Instrument Department engineers are members of technical and/or professional societies. The company pays the salaries and travel ex-

penses for engineers who present papers at technical meetings and for engineers who attend committee meetings. The company pays the engineer's dues to a technical society when membership is considered to be a part of the responsibility of the engineer's position, provided the engineer already belongs to at least one other technical society to which he pays dues. Engineering management maintains a list of members of technical and professional societies and recommends engineers for assignment to committees working in technical areas of interest to the Department, and in the area of professional development. The Department assists the two societies that have local chapters; namely, AIEE and the Massachusetts SPE. It provides meeting places, exhibits, plant tours, speakers, bulletin board space, internal mailing services, and newspaper publicity as requested. Engineers are encouraged to assist in the planning of the agenda and operations of National meetings held in the Boston area, and the company pays the salaries and expenses of engineers engaged in this activity.

Forty-four per cent of the Instrument Department engineers have authored one or more papers. A Signed Articles and Technical Papers Council has been appointed to:

(1.) Generate and discuss ideas for signed articles and technical papers.

(2.) Raise the level of quality of this type of written material.

(3.) Survey the field and determine what areas need more signed articles and technical papers.

(4.) Provide the opportunities for more individuals to participate in writing material for publication.

(5.) Increase the number of signed articles and technical papers written by the Department.

(6.) Maintain good relations with editors and others who influence the publication of such written material.

The Instrument Department assists authors through the distribution of a formal instruction spelling out the steps involved in writing, presenting, and publishing a paper. This instruction outlines the typing, drafting, and photographing services available for preparation of manuscripts. In addition, the services available for coordinating the reviews required for engineering, marketing, patent, and legal approvals are described. Payments made to authors by publishers are presented at brief ceremonies before the author's manager and the general manager of the Department. A quarterly report on papers is sent to each engineering manager. This permits a manager to compare the output of papers by his engineers with that of the engineers in other components. The report also provides the managers with an opportunity to commend the author-engineers, and to bring to the attention of all engineers their professional responsibility to contribute to the published literature.

An annual award is given for the best paper published by a first-time author. This is presented at a meeting of the entire engineering organization, and serves to encourage young engineers to begin early in their careers to report the results of their engineering work. Special awards given by technical societies for excellence in technical papers are presented before the entire engineering organization. Young engineers are encouraged to participate in an annual AIEE tri-sectional technical

(Continued on page 61)

A group of design engineers and marketing specialists attend class in a 21-week course on industrial instrumentation applications at G.E.'s Instrument Department.

Manager of engineering congratulates and presents framed certificates to the latest group of registered professional engineers at the Instrument Department. Similar recognition for registration is also made at the Transformer Division.

PROFESSIONALISM AT QUAKER OATS CO.

Putting Professionalism in the Profit Column

For many people, the first thought that comes to mind regarding The Quaker Oats Company probably has something to do with warm breakfasts, snowsuits, and being hurried off to school on cold winter mornings.

Likewise for most people, engineering would be among the last items to occur in any list of things to consider about Quaker Oats. However The Quaker Oats Company has one of the more carefully planned and apparently effective programs of engineering professionalism in industry. With twenty-seven plants in sixteen states, major research facilities, foreign mills in twelve nations and materials and operating expenses that are near the $250-million-a-year mark, they need such a program.

Engineering isn't the main business of the Chicago-based food producer, but top flight engineering services are obviously much in demand by the company. Chief engineer for Quaker Oats is L. W. Michael, P.E., and this is how he describes the job: "Essentially, we are captive consultants. We are paid to help management, and we feel we have a professional responsibility to help and protect them in any way we can. There is no engineering for engineering's sake. We are paid to do a job."

To see that the job is done, Quaker Oats has engineers at most of its plants plus a "home base of technical competence" at its Chicago headquarters. This home base is divided into six technical groups: (1) structural, (2) electrical, (3) mechanical and chemical, (4) pet foods, (5) milling and (6) packaging. The first three are a normal utility breakdown, and the second trio are primarily process engineering.

For an idea of how much work these six groups handle, the dollars involved are a good measure. In the year ended June 30, 1960, Quaker Oats reinvested over $5-million in its business. Much of this went into modernization and new construction of the Quaker Oats physical plant. Added to other areas of engineering handled by the company, including maintenance, the total figure is in the range of $7- to $12-million each year. Just about every kind of engineering from chemical to construction, is included. At one point there was involved a backlog of some 240 projects, and although this has been reduced, there is still ample work to keep everybody busy.

Perhaps one major reason that a relatively small staff of engineers is able to handle such a large share of engineering work is that the approach is thoroughly professional. Commenting on this is Assistant Chief Engineer W. H. Proescholdt, P.E.: "We feel all engineers should be responsible for the work they do, particularly those who are in direct charge of a given project, and that they should be registered in the various states in which they do business . . . We follow this practice here and find that it has helped us to upgrade our people. We can expect and receive a higher grade of work than perhaps would otherwise be possible."

L. W. Michael, P.E., who heads Quaker Oats' Engineering Department, has insisted on an organized program of professional development for all Quaker Oats engineers.

Actually emphasis on registration is only one of a number of changes that have served to give Quaker Oats engineers more professional and effective working conditions. The changes have been made fairly recently, but already the results are beginning to make themselves known. To see what has happened, it is worth going back a bit to see the way the engineering department was before professionalism and a more streamlined organization began to have their effect.

L. W. Michael jokingly describes a situation some years ago in which "we had two titles in the department: Chief Engineer and Sweeper. Everybody else just worked here. Obviously, this didn't lend itself to an orderly system of promotion, and the effect on morale was noticeable. At lunchtime, or during coffee breaks, or practically whenever there was a free moment, you could find a group of engineers off in a corner griping. We had a backlog of some 240 projects and most of the engineers had good reason to question where they were and where they were headed."

the engineers themselves nor the department as a whole were functioning anywhere near capacity. There is no need to dwell on the situation; what is important is that it existed, and more important, that it was cleared up in remarkably short order with a number of added dividends for the engineers and the company.

AMONG the earliest and most basic steps taken was to set up an orderly professional system of ranking for the engineers in the department. These were junior engineer, associate engineer, engineer, senior engineer and supervisor engineer.

tually, it pretty well sold itself, and it wasn't too long afterwards that the complaint sessions we'd had disappeared." In practice, these grades are not as rigid as they may appear in print. Consideration is given to the work done by the individual, the size of his various projects, and other pertinent performance factors. Within the department, the relative youth of the supervisors would seem to bear out the flexibility built into the system. The structural supervisor is 34, the milling supervisor is 35 and "the rest are right at 40." Adds Michael, "These men don't have to take a back seat to anybody in their fields."

Professional and technical guidance are readily available to the young engineer at Quaker Oats, and a sense of responsibility is mandatory for advancement.

Ample technical support insures that Quaker Oats Engineers are able to devote their time to truly professional work, rather than having to be bogged down with unnecessary details.

Other symptoms were also apparent—supervisors who insisted on doing all but the most detailed work themselves were one example. This lack of orderly and reasonable delegation of work was both demoralizing to junior engineers, and generally detrimental to the over-all departmental output. Comments Michael, "You simply must delegate to do a good job of engineering." With this situation, and 240 projects waiting to be done, projects would occasionally be lost or forgotten, and schedules were vague where they existed at all. In short, there was little if any control, and neither

For the junior engineer, the simple requirement was a college degree. With two years of added training or experience, the engineer could expect the title of associate, and with five to ten years of experience, engineer was the appropriate rank. For the rank of engineer, Michael points out that registration is "encouraged." For senior engineer, registration is mandatory.

At present over half of the engineers in the department are registered. Reminisces Michael, "A few people were probably unhappy about this at the start, but nobody ever fussed about it. Ac-

Why the stress on registration? This is the theory that Quaker Oats uses, in Michael's words: "Engineering registration is more a mark of professionalism than anything else we know. We've tried using just a degree, but many people who have degrees simply can't handle the kind of work we expect of them. We don't set ourselves up to be more expert than the examining boards. You need maturity and common sense to become registered, and incompetents simply can't get by."

Yet a ranking system alone doesn't make a good engineering department, and realizing this, the

next step taken was prompted by the organization of the department itself. Where previously projects had been farmed out to the technical supervisors with only field of engineering involved as a guide, handling of work was now set up on a project basis, with a project engineer directly responsible for the given job. To provide the engineer in charge with necessary support, engineers from other technical sections were assigned as subengineers on a project. The aim and end result of parcelling out the work in this manner was to create teams that would be bound by a common project, and thus a common goal. With this arrangement, and the diversity of projects on hand, it also meant that a given engineer might well be project engineer on one job and a subengineer on another with different technical emphasis. As a result, the engineers soon got to know exactly what problems they were all facing, and a high degree of interdependence and cooperation rapidly developed. Disputes on time of priorities were settled by supervisors or the chief engineer, and through a unique and effective reporting system, both the supervisors and the top engineers in the department were kept informed on who was doing what, how fast they were getting it done, and whether they were going to need more help to meet their deadlines.

AMONG the techniques used to get the new system off to a good start was a weekly meeting of the technical supervisors. Quite simply, this was an organized bull session around a conference table, which gave those participating an opportunity to see just where their own work fit into the over-all job of the engineering department. Explains L. W. Michael, "We had no agenda and the meetings were set up simply to bat the breeze—everything from Sputnik to the White Sox. But we all had an obvious common interest in Quaker Oats and our work, so the discussions usually worked around to this. The end result was that we were able to develop a unanimity of concept and approach that has been invaluable. We would get cross-fertilization of ideas, a better understanding of everybody's problems and generally a more cordial and cooperative working atmosphere." Also, supervisors meet each morning to set up project assignments. Says Michael, "They don't fight on assignments once they are made. They have set them themselves, and so they live with them."

The immediate result of the new approach to engineering at Quaker Oats was to slash the backlog of work to about 100 projects—well over half. Further, Quaker Oats can now point to a recent turnover rate of an infinitesimal three per cent in an industry where the average is much higher, certainly a plus factor on the morale balance sheet.

Perhaps one final quote from L. W. Michael best sums up the total program, the basic idea behind it, and the reason it has worked so well for Quaker Oats: "When I say we are captive consultants, I mean very definitely that we have a professional responsibility to our clients, the management of Quaker Oats. We can't dodge this responsibility any more than the engineer in private practice can dodge his to his client. And I will certainly add that we don't intend to dodge it."

Summing up the program is Assistant Chief Engineer Walter Proescholdt:

Using a project engineering system for program management, Quaker Oats engineers are able to draw effectively upon the talents and skills that are available in many branches of engineering within the department.

Because of the high degree of responsibility that has been nurtured, staffing can be managed at the valley level in a peak-and-valley situation. When the work load becomes too heavy, it is farmed out to consulting firms who provide the extra engineering talent needed. (Michael firmly believes in using outside consultants when appropriate, cites one case where a particular job was done "excellently, in a third of the time it would have taken us.") From an internal standpoint, perhaps the most important factor is that the entire department is kept busy—

"The principal objective of the enginering program within The Quaker Oats Company is to further the objectives of management through the medium of engineering arts. These consist primarily in the construction of facilities which will produce good products at a profit. Product quality, reliability, continuity of service to our customers are thereby enhanced. To accomplish engineering objectives we place responsibility on engineers as soon as they can assume it. In fact, frequently assignments

(Continued on page 61)

Government Functional Section Compiles Data on Engineer in State Government

NINE recommendations for more uniform and professional engineering employment practices have resulted from what is probably the most comprehensive survey of engineering professionalism in state governments that exists.

Compiled and published by NSPE's Functional Section for Engineers in Government Practice, *The Engineer in State Government* is the distillation of information gleaned from a nation-wide survey of state governments. In booklet form, the survey is available from NSPE National headquarters. (See page 16.)

Emphasis placed by the states on registration, their policies on technical and professional society participation, procedures on educational advancement, and existence or lack of merit systems are among the subjects covered in the study, which included answers from 42 states. While the information gathered was encouraging in many respects, it is equally certain that there is room for improvement in the professional position of the engineer who is working for a state government.

Highlights of the survey show a fairly general lack of unanimity on any given subject covered, and in some cases very basic differences are apparent. A few examples underline this pattern. While most states have some form of merit promotion system, frequently all engineers are not covered under the system. Classification and grade plans reported reveal a lack of uniformity. Experience requirements are nearly as disparate, ranging from none to as much as twenty years for some jobs.

However, there were a number of areas in which almost all states seemed to be in substantial agreement. In one fundamental instance, a majority of the states required an engineering degree or its equivalent for engineering positions. Most states also provide some help for the engineer who wants to continue his education. An "overwhelming majority" of the states encouraged engineering employees to take part in technical and professional society activities, through such measures as time off with pay. Also, the majority of the states are in agreement that registration is a necessary prerequisite for certain high level positions.

The purpose of the study was summed up in two broad goals: (1) To focus attention on current practices involving the professional employment and professional development of engineering personnel, and (2) to encourage and stimulate improved engineering personnel policies and higher standards.

It is to the second of these ends that the recommendations included in the study are directed. Because of their basic relationship to the survey, and because of the need for action on a broad scale, these recommendations are well worth quoting:

(1) The engineering profession should increase support of stronger and broader application of merit system principles to state-employed engineers as an expression of professional responsibility for the public interest.

(2) State governments should extend applicability of an engineer-in-training or professional engineer requirement for engineering positions, especially in lower grades.

(3) State governments should use more positive measures to encourage engineer employee registration. Such programs could include: Sponsorship of refresher courses, payment of all or a part of required tuition fees upon successful completion of the course, authorizing prominent display of professional licenses, authorizing use of the P.E. suffix on official correspondence and requiring use of the P.E. seal on all plans, specifications and drawings for which the engineer is responsible.

(4) State governments should take steps to provide engineers with adequate technical and clerical support personnel.

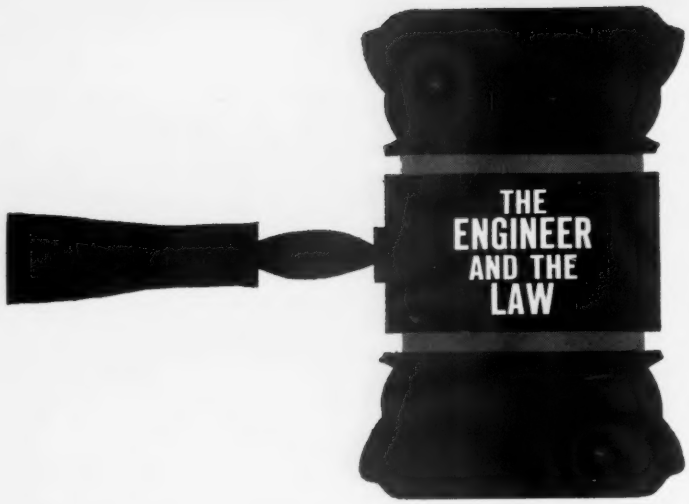
(5) Graduation from an engineering curriculum, or equivalent education and experience, should be required for all engineer positions in the state service.

(6) State governments should expand the aid provided to engineer employees for advanced technical education. Such aid could include payment of all or part of tuition costs and expenses, sponsorship of technical courses for young engineers, a combination scholarship and summer employment program for engineering students and training stipends for work on postgraduate courses.

(7) State governments should continue, and if possible expand, current encouragement of engineer employees to participate in professional and technical society conferences and conventions, serve on committees and prepare and present papers. Policies authorizing time off with pay, plus expenses, should be liberalized.

(8) State governments should restrict "engineer" titles or classifications to persons qualified by

(Continued on page 64)



By
Guest Columnist
MARY C. THOMSON
P.E. and Attorney at Law
Boston, Mass.

Controversial Long Bill on Patent Rights Stirs Some Pointed Comments from Reader

THE April, 1961, issue of the AMERCAN ENGINEER carries, on page 28, an announcement of a bill filed by Senator Long of Louisiana. This Bill, S 1176, is now before the Patent, Trademark, and Copyright Committee of the Senate Committee on the Judiciary, and hearings were scheduled to begin April 18.

Under customary business practice, an engineer who is employed, or engaged as a consultant, doing research for a private organization agrees to assign to the organization the patent rights to any inventions resulting from that research. Proponents of the Long bill argue that the same policy should apply to Government research contracts. To quote from the announcement, "where the Government pays for research, it should obtain the patent rights in any resulting invention or discovery so that these may be available for use of all the people, instead of just a favored few." This sounds like a fair proposal.

It seems fair that you and I should be able to use any inventions resulting from research paid for by our tax money, but what the Long bill would accomplish is something entirely different. This bill would establish a "Federal Inventions Administration" with an administrator having broad powers.

One section of the Bill, 5 (f), provides that "Upon request made by the Administrator, the Attorney General shall initiate and conduct such legal proceedings as may be required for the protection and preservation of the proprietary interest of the United States in any invention." In plain language, this means that the Government can use our tax money (and quite a lot of it because infringement suits are an expensive type of litigation) to sue you and me if we infringe a Government owned patent. Furthermore, some of the important defenses in the usual patent infringement suit would not be available to us because the Government is immune to the anti-trust laws.

Under another section of the Bill, 8 (b), the Administrator can assign a Government patent. In plain language again, this means that the Government can take the patent rights to inventions made by your company under a Government research contract, and assign these rights to your competitor who, of course, can sue you for infringement if you use the inventions. These are only a few highlights which do not appear in the announcement in the April issue.

It is interesting to note on the same page of that issue an announcement of a change in patent policy, under Government research contracts, by the Department of Defense. Instead of retaining merely a royalty-free license for Government use, leaving the commercial rights to the contractor, defense agencies will take full title especially "in new technological fields" where "the inventions resulting from the research will likely dominate the field or be of critical significance in it."

The Government already owns a large number of patents. Fourteen hundred were issued to the Government in 1959, for example. So far Government owned patents have not been enforced. If the Long Bill goes into effect these patents will become a powerful tool for dominating and regulating industry.

Instead of making the results of Government research "available for the use of all the people," the Long Bill would give a Federal Inventions Administration almost unlimited power to use these results for a "favored few."

Engineers, in their capacity as inventors, business managers, and taxpayers, should be vitally concerned about this legislation.—**End.**

Summertime Special:

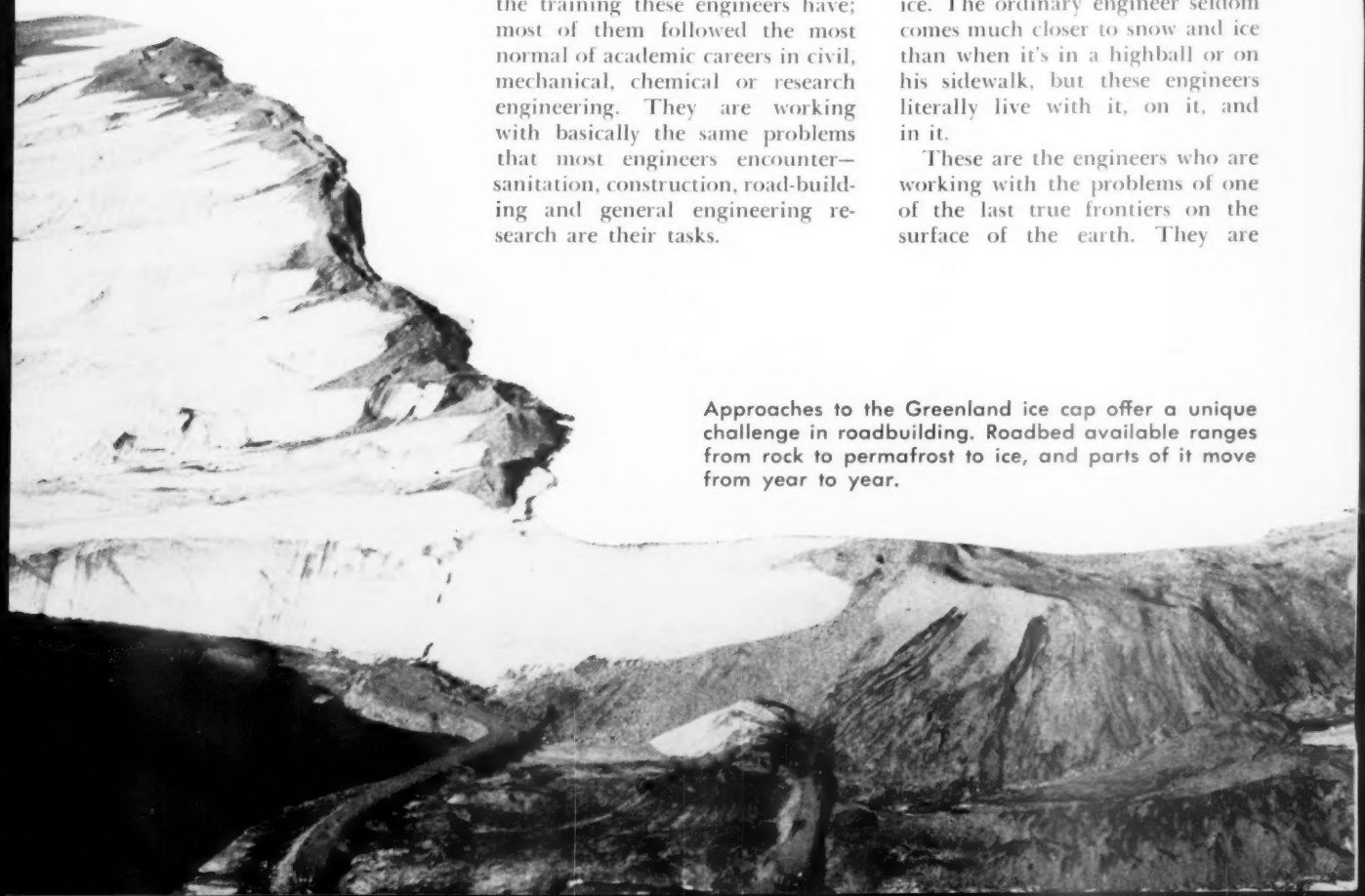
Engineering Under Ice

THERE are probably few engineers in the country today who could provide a quick definition of the difference between a bergy pit and a sastruggi. Those who could, and have first-hand knowledge of either, are a rather rare breed, endowed with a fair share of superheated pioneering blood.

Sastruggi are ridges or waves of snow created by wind, several feet high and several thousand feet long. A bergy pit is a small piece of ice from an iceberg or pack ice. Both are unique to the arctic regions of the world, and both are part of the everyday language of one of the smallest and most strangely employed segments of the engineering profession. This strangeness has nothing to do with the training these engineers have; most of them followed the most normal of academic careers in civil, mechanical, chemical or research engineering. They are working with basically the same problems that most engineers encounter—sanitation, construction, road-building and general engineering research are their tasks.

What makes these engineers a bit different from the ordinary engineer are the conditions under which these engineers work, and the materials they work with. Conditions and materials can both be summed up with a fair amount of accuracy in two words: Snow and ice. The ordinary engineer seldom comes much closer to snow and ice than when it's in a highball or on his sidewalk, but these engineers literally live with it, on it, and in it.

These are the engineers who are working with the problems of one of the last true frontiers on the surface of the earth. They are



Approaches to the Greenland ice cap offer a unique challenge in roadbuilding. Roadbed available ranges from rock to permafrost to ice, and parts of it move from year to year.

working to solve the problems of survival, sustenance and exploration in the coldest regions of the world. The measure of how well these problems are being met is perhaps offered in the tremendous scientific advances in this field that were achieved during the recently ended International Geophysical Year. From an engineering standpoint, the best measure is probably in the amount of practical information that has been gleaned from this work, and the degree to which this information has been applied toward making the arctic habitable, and in many cases, almost comfortable.

Probably the single most important advance in this respect was the recent installation of a nuclear powered heating plant in Northern Greenland, allowing more comfortable year-round operations. While IGY work was carried out in the Antarctic throughout the year, conventional fuels were used. On a one shot project such as the IGY, this is probably the most practical method. But for the continued operations that the Army wants to maintain in Northern Greenland, there can be little doubt that atomic power provides one of the most practical ways in which the job can be done.

With or without atomic power, the work that the cold region engineers are doing is still one of the more novel and interesting phases of engineering going. Leading in the work currently being done in Greenland is Army's Cold Regions Research Engineering Laboratories, under the Corps of Engineers. Also involved are Army's Chemical Corps, Signal Corps, Transportation Corps and a number of other agencies. The work they do covers just about everything from trail marking to water supply for a reason that's fairly plain.

If Army's engineers of the Polar Research and Development Center want to study conditions in the center of Greenland, they must first find a way to cross the ice. They must also find a safe way to avoid the many crevasses on the ice cap, and they must be sure of ending their journey at the right place on the ice cap, which is absolutely devoid of landmarks. As an added problem to navigation, there are horizontally driven snow storms whipped across the island by winds reaching as high as 75 mph. Further, there are "whiteouts," a sort of frozen fog virtually impenetrable to sight.

It is toward solving, or at least alleviating, problems such as these that much of the current arctic research is directed. Engineers, for instance, are currently evaluating a propeller-driven snow vehicle called Kee-Bird, which will move at speeds many times those of presently available vehicles. Electronic and infra-red techniques are being successfully used to detect crevasses covered with snow. Formerly, the only available technique was a tedious and less-than-perfect hand probing system. If the arctic winds and blizzards can't be harnessed, there is still work being done on the whiteout problem. The most promising approach presently seems to be a method very similar to cloud seeding. Using a variety of seeding agents placed from planes, rockets, balloons, mortars and helicopters, Army's engineers have been able to clear a ten to twelve square mile hole with as little as 15 pounds of dry ice after much experimentation. Even without this technique much progress has been made by using iron poles as markers for the trails. Not only do these make obvious guideposts in good weather, but they also serve as excellent radar targets when visibility is poor.

While transportation is a major engineering problem, it is certainly not as basic to survival as is shelter. Construction in Greenland is probably like construction nowhere else in the world, with the exception of the Antarctic. For instance: The glaciers on which buildings are constructed move something on the order of three feet each year. Obviously, under these conditions, permanence becomes a fairly relative factor. One method of beating the problem is to use hydraulic jacks as foundation piles, so that the foundations can be adjusted to allow for movement. If the jack will extend to about thirty feet, the building will have a "permanence" of about ten years. This, however, is doing the job the hard way, and engineers have found a much more logical solution to the shelter problem. Taking a tip from the Eskimoes, Army engineers are using the most abundant building material that is available—the snow and ice itself.

One other factor, summed up neatly by one engineer, has dictated an eminently logical conclusion. Said the engineer: "I don't know just how high the wind gets, but in one storm, the anemometer we had on our wannigan blew away. It was supposed to register up to 100 mph." The clear implication is

Underground tunnels (left) are used for storage, have been bored in horizontally from the edge of the icecap. Below, two engineers from Stanford Research Institute work on top of the ice cap—certainly a far cry from sunny Southern California.

Above, an ice core is extracted from the ice cap. In addition to valuable structural information on the ice cap, these cores are of real historical interest, since deeper core samples date back many hundreds of years. Laboratory facilities (right) are not the most modern and luxurious in the world, but serve their purpose well.

that it's best to get out of the way of the wind, and about the only way to do that is to dig a hole; there isn't much in the way of shelter on the top side of a glacier.

Using two basic techniques, the engineers have been digging into the ice and snow for shelter for several years. At the edge of the ice cap, the job is simply a matter of boring a horizontal hole in the ice. By using a variation on a coal mine digger-conveyor system, tunnels have been dug well over a thousand feet in length. These are used primarily for storage work. One interesting sidelight is that gasoline, if it is simply poured into a hole in one of these tunnels, can be kept almost indefinitely. The gasoline is actually improved in the process because water impurities are frozen out.

The technique used on the top of the ice cap is slightly different, although equally effective. A trench is cut into the snow of the desired length, depth and width. This trench is overlaid, for instance, with corrugated iron arches. These in turn are covered with snow and ice. In a reasonable amount of time the overlay of snow and ice has frozen hard enough so the framing under it can be removed and reused. The covered trench that remains has a roof of hardened snow, and is, in context, a permanent structure.

Camp Century, the installation in the middle of the ice cap which uses atomic power, is made up entirely of these covered trenches. Included in the under-snow complex are such diverse facilities as a mess hall, latrines, living quarters, a library, a gym and, of course, the nuclear reactor itself. In these quarters engineers and their supporting personnel are able to live year-round.

The basic building problem is summed up by an engineer with fairly extensive experience in arctic work. "We have to build on what we call an 'unstable equilibrium.' What I mean by this is that nothing on the ice cap is or can be stable for very long. When we speak of a permanent installation, we think in terms of five or ten years. It is a matter of balancing the value of an installation with the amount of maintenance that is needed to keep it from becoming useless. On an expensive original installation, it is possible to maintain it for a reasonable length of time."

Even with these qualifications, it tends to be something of a frustrating situation. In Navy's Antarctic establishment, for instance, one report described the situation this way: "The eleven buildings built on the surface for the International Geophysical Year are now buried. All have been shored to reinforce the roofs that crack and groan as they slowly give away

to the pressure overhead. Their steel girders and beams are twisted and bent. In spite of the creaking and groaning of tons of snow pressing down overhead and the cracking sound of beams that are slowly giving away, Navymen work on in the old base. Experience has taught them that cave-ins do not happen suddenly, but occur slowly, and can usually be braced in time to prevent collapse."

HOUSING and transportation represent only two of the most basic problems that these engineers face. Sanitation is another. Underground piping is practically out of the question. If such piping isn't heated, it freezes immediately. On the other hand, if it is heated, the costs involved begin to skyrocket, and corrosion becomes a tremendous problem.

From a purely military standpoint, there are another batch of engineering problems to be solved. During the summer of 1960, a combat unit was sent along with Army's engineers and scientists to look into the possibilities and problems that might be involved under the extreme climactic conditions in Greenland. Among the findings: "This exercise has conclusively proven that a great deal of research is in order to adapt the conventional ammunitions of the Infantry small unit to ice cap environments." Loosely translated, this means that weapons simply don't behave the way they should. One example: In the case of one weapon, "Of 24 rounds fired . . . only three rounds detonated and . . . effectiveness was practically nil."

Another aspect of tactical operations which will have to be solved by engineers has to do with weather and terrain, called "the greatest challenging factor in operations in the polar ice cap environment. The total absence of distinguishing landmarks, the constant flatness of the surface, the intensity and diffusion of light on the snow, the utter futility of movement during storms and whiteouts, and the unlimited visibility during periods of clear weather affect, to the detriment of operating troops, every essential facet of tactical operations."

Certainly these are not the sort of problems which will appeal to every engineer. Nor is Northern Greenland the most likely place to settle down for the engineer with a wife and four children. Yet for the engineer who is interested in challenging work and who would be willing to accept a fair share of hardship to find this challenge, there are probably few engineering jobs that would meet these criteria so well.

The fact of the matter is that skilled engineering talent for these jobs is in demand. According to NSPE Past President Clark A. Dunn, P.E., this was one of the needs that impressed him most in an Air Force-sponsored tour of Greenland, Northern Canada and Alaska. In an article appearing in the *Oklahoma Professional Engineer*, Dr. Dunn had these comments to make: "An invitation to join an Air Force inspection trip provided the opportunity to observe military installations well above the Arctic Circle, housing some of the most advanced surveillance and communications equipment, as well as operable underground missile batteries, an experimental tunnel in the ice and the essential support facilities of housing, airport and other service facilities for these activities. This trip made a lasting impression of the crucial needs of the Defense Department for highly skilled engineers and technicians to assure the people of the Nation maximum security."

Thus, there is the responsibility, as well as the challenge, but obviously neither, under the particular working conditions, will be exactly to the taste of all engineers. —**End.**

Easier than pouring concrete are the construction methods used in Greenland (right). This snow miller simply blows snow and ice over a corrugated iron frame and allows it to harden.

Above ground construction is also part of the job in the Arctic (left). However, these buildings are more exposed to the violent wind and weather of the ice cap environment, tend to be less stable than under-ice construction.

Report on a Case by the Board of Ethical Review

The Board of Ethical Review was established to provide service to the membership of the NSPE by rendering impartial opinions pertaining to the interpretation of adopted Canons of Ethics and Statements of Policy regarding professional conduct. The *American Engineer* will print findings on specific cases as they are reported by the BER to the NSPE Board of Directors.

Case No. 60-7

Subject:

Competitive Materials – Reduction of Standards–Section 4, Canons of Ethics; Section 11, Canons of Ethics; Section 12, Canons of Ethics; Rule 14, Rules of Professional Conduct; Rule 25, Rules of Professional Conduct; Rule 26, Rules of Professional Conduct.

Facts:

A consulting engineering firm was retained by a city to design street pavement, the client requesting that the firm design for alternate bids based on asphalt and concrete. The alternate designs were to be for equal quality and service.

When bids were submitted it was found that the one design (A) was approximately fifteen per cent above the other design. (B) The city rejected all bids and called for new bids on a revised design for A. On the new design the A standards were lowered, but the B design was not changed.

At the second bid letting, the new B bids were all lower than the revised A bids by about seven per cent. The consulting firm recommended the award for the revised A design.

Questions:

1. Is it consistent with the Canons of Ethics for a professional engineer to comply with a client's request for a reduction in standards or quality in order to lower the price on a particular material?

2. Was it ethical for the engineer to recommend the award of a contract based on a design of lower standards at a higher price?

References:

Canons of Ethics–Section 4–"He will have due regard for the safety of life and health of public and employees who may be affected by the work for which he is responsible."

Section 11–"He will guard against conditions that are dangerous or threatening to life, limb or property on work for which he is responsible, or if he is not responsible, will promptly call such condition to the attention of those who are responsible.

Section 12–"He will present clearly the consequences to be expected from deviations proposed if his engineering judgment is overruled by nontechnical authority in cases where he is responsible for the technical adequacy of engineering work."

Rules of Professional Conduct –Rule 14–"His plans or specifications will not be such as to limit free competition, except with his client's consent."

Rule 25–"He will not complete, sign, or seal plans and/or specifications that are not of a design safe to the public health and welfare. If the client or employer insists on such unprofessional conduct, he shall call building authorities' attention to the case and withdraw from further consulting business or service on the project."

Rule 26–"He will not apply his signature of approval or seal on plans that do not meet accepted engineering standards."

Discussion:

Question 1–The first and paramount question to be answered is whether the change in design and lowering of performance standards in any way jeopardize life, limb or property. If so, the Canons and Rules are mandatory that the engineer may not be a party to such a decision, regardless of the wishes of the client.

The facts in this case do not indicate that the public interest would be jeopardized from the standpoint of safety. The decision to lower the standards on one product apparently was motivated solely by economic reasons. There is also an implication in this case, however, that the engineers were either a party to, or being used by the client, to favor one competitive material over another. Even so, there is no prohibition of such action so long as the client desired the change or was made aware of the consequences to be expected from it. Here it appears that the client directly ordered the second set of plans with lowered performance standards, and it is to be assumed that a city so doing would know of the resulting effects on performance. Rule 14 is particularly applicable in that it contains a clear authorization for the designing engineer to limit free competition among materials *with the client's consent.*

It is not shown that the engineering firm acted in bad faith or stood to gain any financial advantage by acceding to the client's decision to reduce standards in order to justify selection of one material over another. The engineers' primary duty is to serve the client (subject to the public safety) and it is the duty of the client, particularly in the case of a public body, to defend and justify the use of a more expensive material or one of lowered performance standards, not that of the engineer who is carrying out the client's wishes.

Question 2–In all his professional activities, including the design of public works projects, the engineer's first duty is to safeguard life, health and property, and to promote the public welfare. Decisions

(Continued on page 62)

New Literature

DUST COLLECTION AND RECOVERY—Buell Engineering Company, Inc. has recently published a three-color, four-page brochure describing their complete line of dust collection and recovery systems. Photographs, diagrams of cut-away drawings of each system show clearly the designs and parts of each. Among the systems listed are electric precipatators, mechanical collectors, bag collectors, classifiers, fans, and combination systems. Both standard and automatic dust collectors are discussed, as well as the Buell "LR" fly ash collector.

(Circle 15 in Readers' Service Dept.)

FLUORESCENT LAMP BALLAST—Advance Transformer Company has published a new eight-page Fluores-

cent Lamp Ballast Cross-Reference Guide. This new Advance Guide has been designed to insert in a catalog or perhaps hang from the wall. It contains the catalog numbers of ballasts of competitive manufacturers with the catalog numbers of all Advance FL Ballasts listed alphabetically as suggested replacements. This is the industry's latest and most complete cross-reference guide.

(Circle 16 in Readers' Service Dept.)

ELECTRIC TRUCKS—An engineering case book discussing the role of special electric industrial trucks in diverse operations has just been published by The Elwell-Parker Electric Company. Appearing as an edition of the ELPAR LIFT, the company's periodic material-handling magazine, the free literature defines a *special* truck as one which has undergone a basic modification other than use of a simple attachment. The case book explains the place of the special in today's material handling operations, describes jobs best suited to special models, analyzes the economics of the units, and includes a check list to aid the potential user in considering specials as the solution to his problem applications. Amply illustrated throughout, the brochure also features documentaries showing how a major west coast terminal warehouse operator and the southern mill of a prominent aluminum company have utilized special trucks with dramatic results.

(Circle 17 in Readers' Service Dept.)

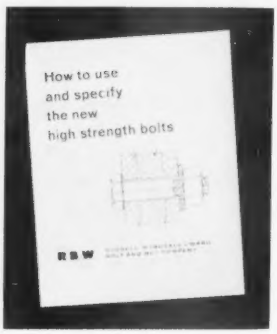
GIRDER PLANS—A useful portfolio of plans for the design and installation of girder rail and girder guard rail in paved areas, such as piers, wharves, docks, streets and roadways, has been published by Bethlehem Steel Company. Its 24 pages are full of details, plans and other information needed to design with these rail sections which have integrally rolled flangeways. With girder rail it is not necessary to improvise flangeways alongside the rail head. Spalling, chipping and other deterioration of paving around flangeways are nonexistent with girder rail. Girder guard rail is a variation of the basic section, used opposite frogs and on sharp curves. Both it and girder rail can be spiked down over tie plates and wooden crossties, or held in place with anchor bolts, rail clips, and tie plates. In addition to details about girder rail and girder guard rail, the portfolio gives useful data on turnouts, frogs, tongue switches and mates, tie plates, clips, and other accessories.

(Circle 18 in Readers' Service Dept.)

FASTENERS GUIDE—An engineering guide for selecting large fasteners and construction accessories in bolt diameters of one and three-quarter inches and up has been published by Jos. Dyson & Sons, Inc. The four-page guide, Bulletin 1260, lists complete specifications for threaded rods, clevises, turnbuckles, coupling nuts, and sleeve nuts. In addition to specifications for standard fasteners, the guide describes typical applications of special fasteners engineered for specific requirements.

(Circle 19 in Readers' Service Dept.)

HIGH STRENGTH BOLTS—Specification and use of high strength bolts for field and shop fabrication of all



types of structural steel assemblies are described in a new eight-page reference bulletin issued by Russell, Burdsall & Ward Bolt and Nut Company. Covering every facet of the most recent development for fabricated structural joints, the illustrated manual contains design theory, specifications, documented cost and production studies, and complete dimensional and physical data on high strength bolts, nuts and washers. A special specification section highlights the latest ASTM specification for A325 bolts with data on bolt sizes, installation techniques, and design considerations for thin sections.

(Circle 20 in Readers' Service Dept.)

RANGE DRIVES—A special brochure on the application of the U.S. Varidyne all a.c. controlled speeds systems to range drives (for paper, fabric, plastic, and metal strip) is now available from U.S. Electrical Motors Inc. Featuring push button speed control and automatic coordination of multiple-motor range drives, the brochure goes into detail on how the frequency-control of speeds in a.c. squirrel cage motors (U.S. Varidyne system) permits motors to start, stop, accelerate to full speed, and accept speed adjustment while running. The Varidyne system keeps all motors completely "in step" throughout the operation without the use of tachometer feedback or other complicated devices. The brochure provides schematics of Varidyne applications on range drives for both tension control, and for "tensionless operation" where the web itself has no strength. A number of typical schematics for Varidyne controlled range drives are given, and there are photographs of several range drive applications representative of the nonwoven fabric field, textiles, and paper impregnation which involves roller-driving the material at "wet strength." Subjects covered include starting the range, stopping the range, presetting the line speed, speed range, threading speed and system braking.

(Circle 21 in Readers' Service Dept.)

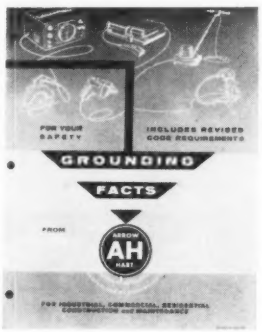
LIQUID LEVEL VALVE GAGES—Two new four-page catalogs—Data Units #397 and #398—illustrate and describe the features, styles, sizes and construction details of Jerguson Union Bonnet and Screwed Bonnet Liquid Level Gage Valves which assure safe, dependable leak-tight service. Included are roughing drawings and detailed tables of standard and optional features.

(Cercle 22 in Readers' Service Dept.)

EXPANSION PLATES & BUSHINGS—Lubrite Division of Merriman Brothers, Inc. has published their Manual No. 55, which contains complete information, technical data, and specifications about Lubrite self-lubricating expansion plates and bushings for bridges, buildings, refinery equipment, chemical processing equipment, high temperature missile and atomic applications. Lubrite plates or bushings are completely self-lubricating and do not require periodic maintenance or servicing. Ideal where ordinary lubrication is objectionable, neglected and expensive to maintain, or for inaccessible plates or bushings.

(Circle 23 in Readers' Service Dept.)

GROUNDING FACTS—Latest information on National Electric Code requirements most likely to affect the



installation and operation of portable electric tools and equipment is available in the revised edition of "Grounding Facts," an eight-page illustrated booklet published by the Arrow-Hart & Hegeman Electric Company. Designed to benefit those who specify, install, use and inspect electrical appliances and equipment, the booklet interprets and clarifies revised code requirements and provides up-to-date information on new types of grounding devices developed especially to satisfy the new requirements for safety. Two pages of the booklet are devoted to picturing and describing typical grounding installations and contain diagrams of the construction of grounding terminals and the U-shaped grounding contacts used in specification grade grounding devices. The final section of the booklet pictures and describes many of the grounding receptacles, caps and connectors in the complete Arrow-Hart line.

(Circle 24 in Readers' Service Dept.)

INDUSTRIAL MACHINERY—"Nordberg Machinery for the World's Major Industries" is the title of a new brochure which illustrates and describes the wide variety of Nordberg products in a single, handy, 24-page reference, recently released by Nordberg Mfg. Co. Prepared in three colors, the new bulletin includes both installation and product pictures of the machinery. Products described briefly are: Diesel Duafuel and gas engines rated 10 HP to over 12,000 HP for municipal and industrial power plants, pipeline pumping, oil well pumping, marine propulsion and auxiliary applications; Symons Gyratory and Cone Crushers, Symons Vibrating Grizzlies and Screens, Gyradisc Crushers, grinding mills, kilns and other machinery for processing ores and industrial minerals, mine hoists, railway track maintenance machinery and special machinery.

(Circle 25 in Readers' Service Dept.)

DATA TAPE SYSTEM—A four-page descriptive folder describing the Mnemotron Model 102A two-channel analog data tape recorder/reproducer system and its uses has been prepared and is available from the manufacturer. Complete specifications of the system are given as well as the extensions of these specs that are available on special request. With a linearity of plus or minus .2 per cent of full scale and an attractively low price of $1390, the Model 102A is a "price-plus-precision breakthrough."

(Circle 26 in Readers' Service Dept.)

TAPPING MANUAL—A twelve-page manual which describes the step-by-step procedure for tapping prestressed concrete steel cylinder pipe under pressure has been released by Price Brothers Company. The handy pocket-size booklet discusses the basic construction of the pipe and describes how small and large taps can be made quickly and safely with ordinary tapping tools and with no interruption in service. Completely detailed and ideal for on-the-job use.

(Circle 27 in Readers' Service Dept.)

These listings are informational only and are not an endorsement of the products, nor of the manufacturer's claims. To receive any of the new literature described in these columns, merely circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

Engineer Describes Ballistic Missile Early Warning System

Battle lines are drawn between the laboratories and industrial plants of the United States and those of the Soviet Union in a technological war of unprecedented challenge to engineers, Henry W. Phillips, manager, Operations Administration, of the Radio Corporation of America's Major Defense Systems Division, said recently before the annual convention of the New Jersey Society of Professional Engineers.

Mr. Phillips declared that thousands of American engineers and scientists are working in defense industries to meet the demands of today's complex weapons systems. He cautioned the professional group, declaring:

"In this day of technological miracles, a breakthrough development may occur in some laboratory or plant—either in the West or the East—and such a development could greatly offset the balance of power in the world.

"America's engineers and scientists must accept the challenge, for if we are to show the world that science flourishes best in a free society, we must win this crucial race."

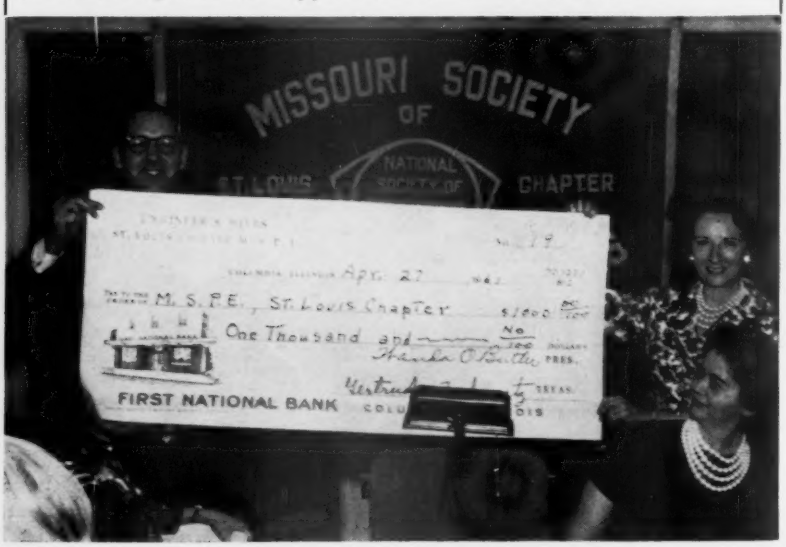
As an example, Mr. Phillips cited the U. S. Air Force's Ballistic Missile Early Warning System (BMEWS). "BMEWS is a challenge to professional engineering, and this challenge is being met by dynamic management and outstanding pioneering in the areas of system integration, automatic checkout and monitoring equipment, high powered radars, simultaneous data flow over long distances, automatic data processing and computational equipment, and displays for command and control functions of our Nation's defenses.

"BMEWS is the largest engineering project to be awarded to South Jersey industry and is one of the major defense projects in the United States. It is being implemented at three northern sites—Thule, Greenland, Clear, Alaska, and Yorkshire, England—as well as at the control center at Colorado Springs."

A registered professional engineer himself, Mr. Phillips has an extensive background in military electronics. He has been contributing to the management of RCA's activities in guided missile and associated fields, and is also a member of NSPE.

St. Louis Chapter

The Engineers' Wives of the St. Louis Chapter, Missouri SPE, have given a flying start to next year's education awards by contributing one thousand dollars to the scholarship fund. Donated in the "new spirit of St. Louis," a giant-sized copy of the check is shown below.



West Virginia Society Plans Membership Drive

Plans for securing new members and for development of chapter programs that would retain old members were considered at a meeting held under the auspices of the Membership Committee of the West Virginia Society of Professional Engineers in Charleston recently.

The key note discussion was led by Col. J. D. Strong, National Society field representative from Washington, who discussed the introductory membership plan and explained how many states have it to secure additional members. A short movie and slides from NSPE were used to emphasize his talk.

Robert R. Griffith of the Appalachian Chapter at Beckley, and Corbet L. Helmick of the Southeast Chapter, Bluefield, discussed working procedures successfully used by their respective chapters. Committee members led general discussion of the membership work throughout the state, and urged all chapters to join in the plan to build up the membership.

Peninsula Chapter Offers Counseling to Students

Students of all high schools in San Mateo County, Calif., who are interested in engineering careers are offered the professional guidance of successful "pro's" in a new career counseling program set up by the Peninsula Chapter, California SPE.

Marshall A. Patch, San Mateo chapter president, reported recently that the group has named practicing engineers to assist regular counselors in 16 high schools throughout the county, supplementing in engineering fields, voluntarily and without pay, the work being done by regular high school counseling staffs.

"The professional engineer feels a strong responsibility to encourage those students who have the particular mental aptitude necessary for engineering," Mr. Patch said, "and to recommend that those who do not have such aptitude go into other fields.

"Engineers assigned to each school," he continued, "may be called at home or at work by any student from the engineer's assigned high school, or by any parent, to answer questions regarding any phase of engineering or its educational requirements. Questions concerning fields with which the engineer is not completely familiar will be referred to other chapter members for answer."

"Bring in one for SIXTY-ONE"

Promotion of membership *is not* the sole responsibility of the other fellow—it's equally yours.

Oklahoma Society Hears G.E. Engineer on Space

Engineers who have achieved fantastic breakthroughs in space technology can only guess what effects their feats will have on people in the future, a leading engineering authority said recently before the Oklahoma Society of Professional Engineers.

Francis K. McCune, a vice president of the General Electric Company and the company's ranking executive in engineering, declared that engineers can foresee only a part of the results of present-day space probes.

"The breakthrough into space speaks volumes for what man has learned and is able to do in achieving forces and speeds necessary to leave the earth's gravitational field," McCune said, "but consider also what a tremendous step it represents in man's ability to communicate. We are now asking intelligent questions and receiving answers from satellites over literally millions of miles of space—with no ultimate limit in sight."

McCune likened recent advances in ultra-high temperature work to man's earliest experiments with fire, which led to the first tools of the Stone Age and ultimately to the foundation of our civilization.

"We simply cannot predict the results—the effects on people. But we can foresee some important areas in which man will exercise his ability to observe and learn and apply through his growing ability to send scientific probes into space and communicate with

Suffolk Chapter

Victor Zukowski, L.S., is shown looking over one of the displays done by the Suffolk Chapter, New York State SPE, with literature from NSPE Headquarters.

Pennsylvania Society

Shown at the annual meeting of the Pennsylvania Society of Professional Engineers at the Pittsburgh Hilton, are Roberts Bouson, president, PSPE (l.), Noah E. Hull, president, NSPE (c.), and Russell M. Jenkins, president, Pittsburgh Chapter, PSPE (r.).

Thoughts on Professionalism...

By PAUL H. ROBBINS, P.E.
NSPE Executive Director

Keeping Up to Date

- Carnegie Tech professor says current college graduates worth more to employer than some older men . . .
- Profession concerned with merging role of science and engineering . . .
- Engineering educators faced with problem of requirements of more extensive science and math training . . .
- Industry concerned with training engineers for the technical team . . .
- Modern personnel policies tending toward lines of parallel progression . . .

THE above concerns are indications of some of the current problems of the engineering profession. It is a well-accepted criterion of professional development that a professional man must keep abreast of the latest developments in his field. Engineers have accepted this for many years, and this is a keystone of the ECPD program of individual development of young engineers. But in the past several years this has become an increasingly difficult assignment for many engineers.

How many engineers who received their education more than fifteen years ago can explain what is involved in the fields of cybernetics, cryogenics, or even the distinction between a digital and analog computer? While the technical societies are doing an excellent job of disseminating the latest technical information, many are becoming concerned that it takes more than casual reading to keep abreast. For one thing, a deeper knowledge of basic science and math is needed than perhaps was given to engineers trained prior to World War II. Second, many of these men have moved into broader responsibilities and hence have not followed the steps leading to the modern technology.

AN interesting program is planned for this summer at the University of California at Los Angeles. The six-week course covers a wide range of modern technology, beginning with a review of mathematics appreciation including statistics, probability and computers and ranging through such subjects as economics, physics of metals, nuclear phenomena, linear programming, decision theory, energy conversion and control systems. The course, in the words of Dean Boelter, will attempt to "develop an understanding of modern engineering methodology and disciplines" and is designed for "the engineering executive who will wish to augment his knowledge of modern engineering systems, their components, and the additions to engineering methodology."

WHILE the problem of keeping up with the exploding technology is undoubtedly the primary responsibility of our technical societies, it is a fundamental concept of the professional society to encourage its members to broaden their backgrounds such that they will be able to meet the increasingly complex challenges of our economy. NSPE chapters could do well to explore the opportunities in their communities and to call to the attention of their members not only their responsibility for keeping themselves abreast of current developments but also programs and techniques available locally.

them—or eventually through travelling in space himself."

McCune listed these predictable results:

A satellite system for terrestrial communication, study of interplanetary matter, radiation in space above our atmosphere, space environment effect on life, and improved observation, prediction and possibly control of weather through a satellite system "of truly global dimensions."

In these areas man will observe, learn and teach, McCune said, but "what the applications will be and what their effects on people will be we simply have no way of knowing."

Alabama Annual Meeting Reports Profitable Year

Establishment of a new chapter at Decatur, solidifying of support for new legislation to clarify the present registration law, projection of intensified membership recruiting, and plans looking to perfecting services for members, were among the highlights of the Annual Meeting of the Alabama SPE held in Montgomery recently.

Petition for Charter by the Decatur Chapter, which began with well over the minimum required enrollment, was approved by the Board of Directors at its formal session in the morning.

An impressive part of the meeting was the report of the membership committee which showed an enrollment of more than 500, with two chapters over the 200 mark.

Raymond C. Roberts, P.E., Huntsville, manager of Brown Engineering Company, was elected president, succeeding Henry R. Hudson, P.E., Montgomery, head of Hudson Engineering Company. Other officers installed at the meeting were: James A. Evans, Birmingham, first vice president; T. M. Francis, Birmingham, second vice president; J. O. Holloway, Montgomery, treasurer; John D. Deal, Jr., Huntsville, secretary; Millard R. McGruder, executive director; Leonard S. Woody and James A. Evans, national directors; and George Murphy, Auburn, and M.

Illinois Society

Winner of the 1960 Illinois Award for outstanding contributions to the Illinois SPE and to the engineering profession, James P. Murphy, P.E., with his wife, proudly examines the trophy presented to him at the Peoria banquet.

Dr. Beatrice A. Hicks, P.E. (l.), and Rodney D. Chipp, P.E., (r.), NSPE "ambassadors", addressed Members of the Illinois SPE and their wives at the annual banquet in Peoria recently, speaking on "How Engineers Can Improve U.S. Relations with South America."

F. Tooker, Decatur, members of the executive committee.

A special citation was given the Northeast Alabama Chapter for its phenomenal membership development and its activities in various directions which have contributed to the advancement of the Society and the profession. The Montgomery Chapters served as hosts for the meeting.

George L. Krulewitz, P.E.

George L. Krulewitz, P.E., engineer with the New York engineering firm of Ford, Bacon & Davis, Inc., died recently in Long Island at the age of 45. Mr. Krulewitz, a specialist in instrumentation, was a graduate of Cooper Union. He was a member of the New York State Society of Professional Engineers and the Instrument Society of America.

A. J. Zimmerman, P.E.

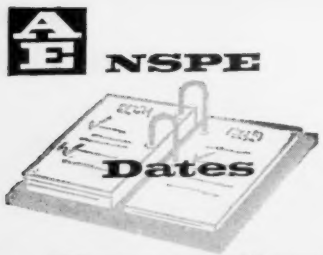
A. J. Zimmerman, P.E., executive vice president of Thompson Materials Corp., Belleville, N. J., died recently at his home at the age of 59. A civil engineering graduate of Manhattan College, Mr. Zimmerman was past president of the Passaic County Engineering Society and a component of the New Jersey Society of Professional Engineers.

CORRECTION

Page twelve of the June AMERICAN ENGINEER incorrectly stated that the state engineering licenses for Alabama expire on September 30. The correct expiration date for **Alabama** licenses is December 31. We also regret omitting notice that licenses in the State of **New Hampshire** expire on June 30.

Florida Society

The Florida Engineering Society recently dedicated its new State Headquarters Building, the first state society to build its own headquarters. Shown at the opening ceremonies are Albert E. O'Neall, secretary, FES, Jim Shivler (cutting the ribbon), and NSPE Executive Director Paul H. Robbins.



to Remember

National Society of Professional Engineers—Annual Meeting, July 4-7, Olympic Hotel, Seattle, Washington.

Arizona Society of Professional Engineers—Annual Meeting—July 1, Arizona.

West Virginia Society of Professional Engineers—Annual Meeting—October 5, 6, Morgantown, West Virginia.

Virginia Society of Professional Engineers—Annual Meeting—October 19, Hotel Roanoke, Roanoke, Virginia.

National Society of Professional Engineers—Fall Meeting, October 19-21, Hotel Roanoke, Roanoke, Virginia.

Southwestern Chapter

Newly registered professional engineers and engineers in training in the area of the Southwestern Chapter of the Indiana SPE receive complimentary copies of NSPE's "Life Book" from the chapter.

St. Louis University Installs Student Chapter

The St. Louis University Institute of Technology student chapter of the Missouri Society of Professional Engineers was formally installed recently on the campus. This is the first student chapter of the Society to be established in Missouri. C. W. Schemm, P.E., president of the Society, presented certificates of award to Reverend Victor J. Blum, S.J., dean, Institute of Technology, and to John F. McCarthy, P.E., director of civil engineering and moderator of the new chapter for their inspiring leadership resulting in an atmosphere favorable to the establishing of a student chapter. Its establishment by the engineering students encourages the development of professional attitudes early in their careers. As part of the installation ceremony, Schemm said that a professional concept is an individual, personal attitude and it is not something outside one's self. The professional society provides a favorable climate but the individual must attain the concept.

O. J. Ruel, P.E., president of the St. Louis Chapter, MSPE, welcomed the new student chapter. The guest speaker, P. N. Doll, P.E., executive director of the Missouri Society of Professional Engineers spoke on "Inside MSPE."

Mankato Student Chapter

Mankato State College's student chapter of the Minnesota SPE has become the first student organization in the United States to affiliate with NSPE as a Delta student chapter, which are formed at colleges having two fully accredited years of pre-engineering curriculum. Participating in the charter presentation in Mankato recently were (l. to r.) Raymond A. Janssen, immediate past president; Arlen Bowen, president of the student chapter; Fred R. McComb, president of MSPE; Leighton G. Lloyd, president of the Traverse Des Souix Chapter, MSPE; Dr. Finn J. Larsen, vice president in charge of research at Minneapolis-Honeywell Regulator Co. and main speaker for the evening; and John Scholmeier, faculty advisor to the group. The charter, granted in February, was presented to the student group in May.

NSPE news briefs

Contra Costa Chapter

At a recent meeting, Douglass Judd (left above), president of the California SPE, installed Richard Schelin for his third term as president of the Contra Costa Chapter, and Carole Langlie (c.) as president of the Women's Auxiliary. Also shown is Bertram Hirsch, vice president, Northern Region, CSPE. Banner shown in the picture was made and presented to the Chapter by the Auxiliary.

• The **Orange County Chapter** of the **California SPE** recently elected Bernard F. Syfan, Laguna Beach, as president. Other officers named were Will H. Lindsay, Jr., Anaheim, vice president; A. T. Stover, Santa Ana, secretary; Selwyn P. Ramsay, Anaheim, treasurer; and Urban Beh, Newport Beach, state director. Newly elected chapter directors are William R. Ishii, Buena Park; Wallace C. Olson, Corona del Mar, and Robert F. Rocco, Garden Grove.

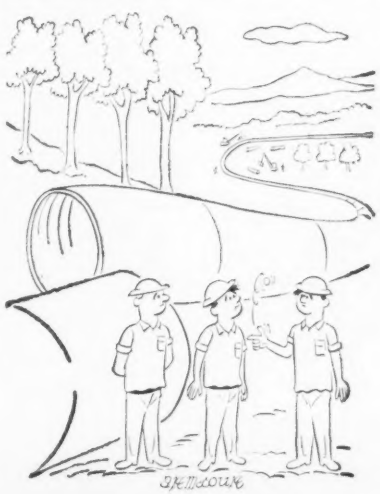
• **James F. Fairman,** chairman of the Committee on the Merging Role of Science and Engineering, was recently author of a guest editorial on "Hard-Head Engineers" in the April, 1961, issue of *Combustion* magazine.

• The Michigan Association of the Professions recently elected N. O. Saulter, Detroit, immediate past president of the **Michigan SPE,** to the office of vice president.

• The **District of Columbia SPE** recently paid tribute to the Federal Aviation Agency under its policy of honoring major Federal employers of engineering personnel. At a recent chapter meeting, James T. Pyle, deputy administrator of the FAA, as featured speaker stressed the need for increased administrative training for Government engineers to supplement their engineering background. Previous meetings have honored the Army's Corps of Engineers, the Navy's Civil Engineer Corps, and the Air Force Directorate of Civil Engineering.

• The highest tribute paid by the Exchange Club of Long Beach, Calif., recently went to NSPE member **M. A. Nishkian,** consulting engineer of Long Beach. Named "Citizen of the Year" at a luncheon meeting, Nishkian was praised for his contributions to both his profession and the community.

• The Society of American Military Engineers recently announced the award of its National Award for Navy Engineering Achievement for the year 1960 to Vice Adm. W. Orme Hiltabidle of the



District of Columbia Society.

• The **Wisconsin Society** recently named the FWD Corporation of Clintonville, Wis., its "Industry of the Year." FWD, makers of heavy duty multi-drive vehicles, was cited for its outstanding attitudes toward engineering development and progress.

• The **Oklahoma Society** has selected the Dresser Engineering Company of Tulsa, as the recipient of its outstanding award of the year. The award is given yearly to the company or firm selected as contributing most to the development of professionalism among engineers.

• Fred C. Limbert, Toledo, Ohio, has been elected chairman of the Functional Group of the Consulting Engineers of Ohio, which was organized in 1956 by the **Ohio SPE** as a professional discussion group.

• The **Knoxville Chapter** of the **Tennessee Society** recently established a fund to provide a $250 annual scholarship to the University of Tennessee. Lloyd Jones, president of the Knoxville Chapter, an-

nounced that the scholarship will be awarded each year to a worthy student enrolled in the school of engineering at the University. Money for the scholarship is being contributed by the members of the Chapter on a continuing basis. The recipient of the scholarship will be introduced to the chapter members at the regular September meeting each year.

• At the recent Engineers Day celebration in Madison, Wisconsin, five outstanding men in industry and engineering were cited for accomplishments in their field. The University of Wisconsin College of Engineering faculty and UW President Conrad A. Elvehjem awarded the following individuals distinguished service citations: John J. Chyle, director of welding research, A. O. Smith Corp., Milwaukee; William T. Ennor, assistant director of research, Aluminum Company of America, New Kensington, Pa.; Oswald J. Muegge, state sanitary engineer of the Wisconsin State Board of Health, Madison; Merrill A. Scheil, director of metallurgical research, A. O. Smith Corp., Milwaukee; and Frederick M. Young, founder of the Young Radiator Co., Racine.

• Julian Montgomery, distinguished engineer of the **Texas SPE,** was recently the first engineer ever to be appointed by the governor of the state to the Commission on Higher Education.

By Mrs. Clark A. Dunn, Chairman, Ladies Auxiliary Advisory Committee.

First, let me call your attention to the promotion sheet, *Identify Yourself as an Engineer's Wife*, which the NSPE office has reproduced in quantity for us. This will be recognized as the inside back cover of the 1960 *Engineers' Wives*. If your chapter is interested in organizing an auxiliary, this is excellent material for use in stimulating interest. It can also be used for membership or attendance drives. These promotion sheets are available to you in limited numbers. Send your request for copies to the NSPE office.

Incidentally, the suggestion that we use this material for promotion purposes came from the Gloucester-Salem Chapter Auxiliary of New Jersey. Our thanks to them.

The Ladies Auxiliary in the Magic Valley, Idaho, is an unusual one. The members live in many different communities in the state and gather only when their husbands are meeting. Sociability and a chance to get acquainted with other engineers' wives are the main objectives of the auxiliary. Social events include a spring tea, a Christmas party and a family picnic in August.

The Essex County Auxiliary of New Jersey reports a successful year. They have proved what everyone knows—that a good program increases interest and attendance. One outstanding program was given by Bob Dunn, the syndicated cartoonist. His lecture included caricatures made of some of the members.

This year the Western Chapter Auxiliary of Kansas City, Missouri, is giving an award at the Science Fair and also an award to a high school boy and girl who are outstanding in science and mathematics. This auxiliary also held a family picnic recently.

The Auxiliary to the Dallas, Texas, Chapter has begun a new project which will interest girls who are considering a career in engineering. They give a slide rule to the girl with the outstanding engineering project at the Science Fair.

One of our newer auxiliaries, The Contra-Costa Chapter Auxiliary of California, reports a successful year. They have had regular monthly meetings as well as joint meetings with the men. As a project this spring they made a chapter banner of felt which was presented at their annual meeting.—**End.**

Kansas Legislation

Kansas Governor John Anderson, Jr., is shown signing a bill to amend the Professional Engineers Act to require mandatory examinations for all new applicants in Kansas. Witnessing the signature on the bill are members of the Kansas Engineering Society, including two members of the legislature who were two of the cosponsors of the bill. The bill is one of a series of laws that have been enacted by the Kansas legislature concerning the engineering profession, and will contribute to assuring better engineering of the future to the people of Kansas.

UNIONS

(Continued from page 26)

In the summer of 1960, the Association of Professional Engineering Personnel struck five Radio Corporation of America plants in the Camden, N. J., area. Affiliated with ESA, the organization was out for six days. Production workers refused to cross the picket lines to be paid, and demanded paychecks be handed out outside the plant. The end result was a snake-dancing, egg-throwing melee in which seven engineers were arrested, charged with, among other things, disorderly conduct and assault and battery of a police officer.

To these methods of violence and coercion, the engineer has said, "No." It is a measure of overall professional responsibility that the engineer has said, in election after election, "No union." Professional development through professional responsibility has been the choice in the past, and there is every indication that it will continue to be in the future. **—End.**

GROGAN

(Continued from page 31)

MANY people predict our colleges will not be able to accept half of their applicants by 1975. Need these people be lost? No, I believe they can be educated outside of the classroom. I believe that higher education should serve a more noble purpose than the mere perpetuation of the art and science for the benefit of a chosen percentage in each generation fortunate enough to gain access to the cloistered and coveted college classrooms. A philosophy of education for a whole people has permeated the Wisconsin scene through the years. This idea has been responsible for our attitude and position in bringing the services and resources of the University to the people of the state.

A problem in one of our correspondence study courses involves the calculation of the tensile stress in a bolt or tie-rod to a suspended weight. One of our students set the problem aside with the statement that he never encountered that type of thing in his work. Is he thinking about tomorrow? Is he

By Popular Demand . . .

A HANDY AND DISTINCTIVE BINDER FOR 12 ISSUES OF THE AMERICAN ENGINEER

Now you can build an easy reference to the many fine articles and features which appear in the American Engineer by slipping your monthly issues into this new handsome maroon (silver lettered) DuPont fabricord binder.

The binder has 12 removable heavy-tempered flat steel rods and solid nickeled screw posts on each end which are easily operated. Though rugged, the binder is beautifully finished and has a reinforced stiff back which is lined for greater wear.

order yours today **$3.00** ***each postpaid***

AMERICAN ENGINEER Magazine 2029 K Street, N.W., Washington 6, D. C.

Please send me prepaid.....(no.) American Engineer binders.

I enclose $..... Send the binder(s) to
Amount

Name .....
(Please print)

Street .....

City ..... Zone..... State .....

CLASSIFIED ADVERTISING

Minimum 3 lines.
Undisplayed, $1.80 per line. Three or more consecutive insertions $1.50 per line each.
Displayed: Same rate as General Advertising.

Positions Wanted: Undisplayed, 90¢ per line. Three or more consecutive insertions 75¢ per line each.
Displayed: General Advertising rates, less 50%.
Box Number chargeable as one line.

Mail Box Number replies to:
AMERICAN ENGINEER
2029 K Street, N.W. Washington 6, D.C.

Positions Available

DISTRIBUTION ENGINEER. Excellent opportunity for a young electrical engineer with 3 to 5 years experience in overhead distribution engineering in a public utility, in a fast-growing southwest area. Should have working knowledge of underground distribution system. Salary open. Box 501, AMERICAN ENGINEER.

MECHANICAL ENGINEER. Excellent opportunity at Project Engineer level for BSME with minimum 10 years experience, preferably in heating, ventilating, and air conditioning. Position permanent and open immediately with established Midwest consulting firm designing industrial plants, power houses, public buildings, office buildings, laboratories. Moving expenses paid. Write Box 301, AMERICAN ENGINEER.

CONSTRUCTION
THERMAL POWER STATIONS
PROJECT SUPERINTENDENTS
ASSISTANT PROJECT SUPERINTENDENTS
Civil - Mechanical - Electrical
START AND TEST ENGINEERS
SHIFT OPERATORS
LOCATION FAR EAST
Qualified applicants submit résumé to
THE KULJIAN CORPORATION
Construction Division — Dept. D
1200 N. Broad St. — Philadelphia 21, Pa.

Positions Wanted

ASSOCIATION WITH CONSULTING ENGINEER or Architect in a Southern community desired by a young, currently employed, Registered Professional Engineer with experience in mechanical, electrical and machine design and field supervision on industrial and educational projects up to $4,000,000. Small initial investment possible. All identified responses will be held confidential and answered. Write Box 500, AMERICAN ENGINEER.

MECHANICAL ENGINEER, P.E. Pennsylvania and Louisiana, age 40, experience in industrial facilities engineering and instrumentation. Prefer Middle Atlantic, South, or Southwest. Write Box 600, AMERICAN ENGINEER.

LICENSED PROFESSIONAL ELECTRICAL ENGINEER, public utility experience, desires position with consulting engineering firm. Desired location area bounded by Kansas City, Denver, and Dallas. Complete résumé of experience and education will be sent to all responses and all responses will be held confidential. Write Box 700, AMERICAN ENGINEER.

ENGINEER: Project level position open in Houston, Texas, area with established engineering and construction firm. Minimum Qualifications: BS-CHE Degree, 8 years experience in design water treatment units for power plants and sanitary and sewage treatment plant; ability to perform all phases of design, engineering, including the necessary calculations, specifications, and feasibility studies. Desirable also to have operating experience. Duties include supervision and coordination of engineering, drafting, and requires customer contact. Normal fringe benefits. Submit two copies of complete résumé with photograph to: Box 701, AMERICAN ENGINEER.

MACHINE DESIGNER. Excellent opportunity at Project Engineer level with minimum ten years experience in Design and Layout of special machines. Position open immediately with established Mid-west consulting firm. Moving expenses paid. Write giving complete experience record, including references and photo. Replies will be kept confidential. Box 702, AMERICAN ENGINEER.

Professional Services

INVENTION DEVELOPMENT. Experimental equipment. Patents. Details on request. Todd Consulting Engineers, 424 West 119th St., New York 27, N. Y.

Supplies

ENGINEERS' SUPPLIES. Complete K. & E. surveyor's Transit and Leveling Rod. In perfect condition. $350. PL 9-4810—PL 9-8562, Belleville, N. J.

Your Classified Advertisement Here Will Reach More Than 60,000 Readers!

preparing himself to meet greater challenge and opportunity? We must be better prepared than we expect to perform. A doctor carries more than one tool or drug in his satchel. He must be ready for a myriad situation. Whether managers of businesses or maintenance men, we cannot be using our last ounce of intelligence on the mere turning of a wheel.

One may not realize it, but a little extra effort pays off handsomely. The winner of four out of five races is not four times better than the field. He may be only one-half or one per cent better. He runs the whole race with a plan, conserving some energy to assure his success when the chips are down.

We all saw or heard about the running of the relay race in the last Olympics when a momentary error in judgment by one or more of the United States runners with respect to passing the baton cost the best team the race and the attendant Gold Medal Awards. That should serve to show how slim is the line between success and failure. The outcome of a national election might possibly turn on the wrong choice of word or coloration before a television camera.

Every one of us must look upon the years of our formal education, whatever the terminus, as merely the period of building a foundation for our respective future careers. There is a current high demand and attractive employment opportunity for any one of us with a skilled trade or profession resulting from a program of formal training or work experience. But very little of the future edifices to be built throughout our productive years shows at the present time. We should be pleased about this. If we are to build a landmark, we should begin solidly and well. The better the foundation, the higher you can build. If one expects to build unusually high he will have to provide a broad, deep base. One may think of a man's potential for growth in terms of so many building blocks. He doesn't know exactly how many blocks he has at the moment or how many others he may acquire through life. Nevertheless, he wants to build an edifice of some kind. He has the choice of beginning on a grand scale and perhaps never getting more than three courses high. Such a man is too general. Another may decide to push his structure up rapidly on a very small base. He is too specialized and may be toppled by the forces of nature that beset him.

The wise man will take stock of himself and his building materials. He will establish a plan and proceed to build it. There will be certain capstones and embellishments that he will plan to acquire in the course of the building program. The final result will be a sound structure, integrated with the surroundings and presenting one or more towers of information over a broad utilitarian base.—**End.**

(Continued from page 33)

patient relationship); the inspirers—Hippocrates, Galen, Vesalius, Pasteur, Freud, and in this day Salk—men whose lifework was the enlargement and practice of the healing art.

And lastly, scholarship and teaching: The ideal—knowledge; the institution—the school (or university); the inspirers—men of caliber of Bruno, of Galileo, and primarily, of Socrates.

What consequences flow from the presence of ideals, institutions and inspirers in the learned professions? These: That those who practice these professions have the ideal to inspire them, the institution as the embodiment of the professional spirit, and the inspirers as guides and models of thought and action. And therefore, in the learned professions, there has developed an "esprit de profession" which has manifested itself as "resistance to lay control," "academic freedom," "the Oath of Hippocrates," and "acting as an officer of the court."

Let us now examine the profession of engineering, to determine whether for it there can be found an ideal, an institution, and inspirers.

As to the ideal, one has been suggested by Admiral Rickover, in his statement concerning the engineer's code of professional ethics: "The most important aspect of the engineer's code of professional ethics ought to be the obligation to do nothing that will unnecessarily aggravate future resource deficiencies . . . [the engineer's] greatest task is to do everything that he can to preserve opportunities for a good life to coming generations who will not be as rich in land and resources as we are today." Or, to condense this statement into a single phrase—"The well-being of humanity, now and to come." Adherence to this ideal poses perhaps a greater challenge to members of the engineering profession than adherence to their ideals does to the members of the learned professions. The ideal of the engineering profession requires that thought be given not only to the present state of affairs, but

PROFESSIONAL DIRECTORY

California-Illinois

INTERNATIONAL ENGINEERING COMPANY, INC.
Design and Consulting Engineers
Dams — Power Plants — Transmission Lines Railroads — Highways Investigations — Reports — Plans and Specifications — Cost Estimates — Supervision of Construction
74 New Montgomery Street
San Francisco 5, Calif.

KAISER ENGINEERS
Division of Henry J. Kaiser Company
Engineers — Contractors
300 Lakeside Dr., Oakland 12, California

MINER AND MINER
Consulting Engineers
Incorporated
Greeley, Colorado
Littleton, Colorado
Tucson, Arizona Phoenix, Arizona

JOHN J. MOZZOCHI AND ASSOCIATES
Highways — Airports — Developments
Survey — Design — Inspection
265 Hebron Avenue Glastonbury, Conn.

CONRAD M. CARLSRUD
Mechanical Engineer
Industrial Consultant
122 Clowes Terrace
Waterbury 10, Conn.

WILBERDING COMPANY, ENGINEERS
Consulting — Design
Mechanical — Structural
Civil — Electrical
Land Planning
Sanitary
1023 20th Street, N.W., Washington 6, D.C.

JAMES H. CARR, JR.
Timber Engineering Consultant
Specializing in investigations and recommendations for maintenance and repair of existing timber structures.
2138 P St., N.W. Washington 7, D. C.

ROBERT AND COMPANY ASSOCIATES
Consulting and Designing Engineers
Industrial Plants — Municipal, Highway and Airport Improvements — Power Plants — Water Supply — Sewage and Industrial Waste Disposal — Appraisals — Reports.
Atlanta, Georgia

WARREN & VAN PRAAG, INC.
Consulting Engineers
Since 1918
Highways - Pavements - Bridges - Grade Separations - Airports - Drainage - Street Lighting - Waterworks - Sewerage Investigations - Reports
253 South Park Street, Decatur, Illinois
1224 North Capitol Avenue, Indianapolis, Ind.

HOMER L. CHASTAIN & ASSOCIATES
Consulting Engineers
Civil, Structural, Mechanical, Industrial Design & Supervision, Construction, Engineering, Turnpikes, Bridges, Water Supply, Sewerage, Flood Control & Drainage, Material Controls, Municipal Engineering, Topographic Surveys.
155½ West Main Street Decatur, Illinois

CONSOER, TOWNSEND & ASSOC.
Consulting Engineers
Sewage treatment, sewers, storm drainage, flood control — Water supply and treatment — Highways and bridges — Airports — Urban renewal — Electric and gas transmission lines — Rate studies, surveys and valuations — Industrial and institutional buildings.
360 East Grand Avenue, Chicago 11, Illinois

DE LEUW, CATHER & COMPANY
Consulting Engineers
Public Transit — Subways
Traffic & Parking — Railroad Facilities
Expressways — Industrial Plants
Grade Separations — Municipal Works
Urban Renewal — Port Development
150 North Wacker Drive, Chicago 6
San Francisco New York Boston

SARGENT & LUNDY
Engineers
Consultants to the Power Industry
Studies — Design — Supervision
140 South Dearborn Street, Chicago 3, Ill.

SOIL TESTING SERVICES, INC.
Consulting Soil and Foundation Engineers
John P. Gnaedinger Clyde N. Baker, Jr.
Site Investigations
Foundation Recommendations and Design
Laboratory Testing, Field Inspection & Control
1827 N. Harlem Avenue, Chicago 35, Illinois

STANLEY ENGINEERING COMPANY
Consulting Engineers
Hershey Building 208 S. LaSalle St.
Muscatine, Iowa Chicago 4, Illinois
Hanna Building
Cleveland 15, Ohio

PIONEER SERVICE & ENGINEERING CO.
Consulting and Design Engineers
Public Utilities — Industrials
Purchasing — Construction Management
231 S. LaSalle St. Chicago 4

DAMES & MOORE
Consultants in Applied Earth Sciences
Soil Mechanics Engineering Geology
Geophysics
Atlanta, Chicago, Honolulu, Houston
Los Angeles, New York, Portland
Salt Lake City, San Francisco, Seattle

CRYSTAL LAKE ENGINEERING COMPANY
Engineers
Design—Develop—Manufacture
Intricate—Assemblies—Products
Miniature Precision Grinding
Write or Phone 459-3500
10 Gates St., Crystal Lake, Ill.

PROFESSIONAL DIRECTORY

Illinois-Missouri

WIGHT AND COMPANY
Consulting Engineers
Bridges, Express Highways, Paving, Water Systems, Sewage and Waste Disposal, Flood Control and Drainage, Airports and Buildings, Site Planning, Reports.
814 Ogden Ave., Downers Grove, Ill.
446 E. Main St., Barrington, Ill.

CHAS. W. COLE & SON
Engineers—Architects
South Bend, Indiana

WILSON & COMPANY
Engineers
Water — Sewerage — Streets — Highways
Bridges — Eectrical — Airfields — Drainage
Dams — Treatment Plants
Industrial Installations
Chemical Testing Lab — Aerial Mapping
Electronic Computer Services, Reproduction
631 East Crawford **Salina, Kansas**

SERVIS, VAN DOREN & HAZARD
Engineers-Architects
Investigations — Design
Supervision of Construction — Appraisals
Water — Sewage — Streets — Expressways
Highways — Bridges — Foundations — Airports
Flood Control — Drainage — Aerial Surveys
Site Planning — Urban Subdivisions
Industrial Facilities — Electrical — Mechanical
2910 Topeka Blvd. **Topeka, Kansas**

BEDELL & NELSON ENGINEERS INCORPORATED
Consulting Engineers-Architects
Design — Supervision — Reports
Airports — *Highways & Bridges*
Buildings — *Industrial Plants*
Bulk Terminals — *Municipal Works*
City Planning — *Subdivisions*
Docks & Wharves — *Utilities*
1200 St. Charles Ave. **New Orleans, La.**

EUSTIS ENGINEERING COMPANY
Foundation and Soil Mechanics Investigations
Soil Borings — *Laboratory Tests*
Foundation Analyses — *Reports*
3635 Airline Highway
Metaire, Louisiana

WHITMAN, REQUARDT & ASSOCIATES
Engineers — Consultants
Civil — Sanitary — Structural
Mechanical — Electrical
Reports, Plans Supervision, Appraisals
1304 St. Paul Street, Baltimore 2, Maryland

FAY, SPOFFORD & THORNDIKE INC.
Engineers
Airports, Bridges, Express Highways
Water Supply, Sewerage, Drainage
Port and Terminal Works
Industrial Plants *Incinerators*
Investigations, Reports, Designs
Supervision of Construction
Boston, Massachusetts

METCALF & EDDY
Engineers
Soils, Foundations, Waterworks, Sewage Works, Drainage, Irrigation, Flood Control, Refuse, Industrial Wastes, Airports, Highways, Military Projects, Industrial and Commercial Facilities.
Statler Building, Boston 16, Massachusetts

W. L. BADGER ASSOCIATES, INC.
Chemical Engineers
Consultants and Specialists in Evaporation Crystallization, Heat Transfer; Design of Plants for Production of Salt, Caustic Soda, Organic Chemicals; Sea Water Conversion; Dowtherm Installations.
309 South State Street, Ann Arbor, Mich.
Telephone: NOrmandy 2-6142

COMMONWEALTH ASSOCIATES INC.
Consulting and Design Engineers
Power Generation
Electric — Gas — Water Systems
Industrial Planning
209 E. Washington Ave., Jackson, Michigan

THE HINCHMAN CORPORATION
Consulting Engineers
WORLD-WIDE ACTIVITIES
Survey — Design — Supervision
Specializing in Corrosion Control
F.C.C. Certification Tests
Electromagnetic Interference Studies
Francis Palms Building, Detroit 1, Mich.

A. C. SAMPIETRO
Consulting Engineer
Research — Design — Development
Automotive Vehicles and Internal Combustion Engines
286 Puritan **P. O. Box 386**
Birmingham, Michigan

SOIL SOLIDIFIERS INC.
CONTRACTING AND ENGINEERING IN SOIL SOLIDIFICATION
Experience, "know-how" and special equipment for chemical solidification of soil. Applications: Equipment & Structure Foundation Control & Correction—Solidifying Quicksand — Underpinning — Water Flow Stoppage—And Many More.
10601 Olson Memorial Dr. **LI 5-7551**
Minneapolis 27, Minn.

WALTER H. WHEELER
Consulting Engineer
Plans Specifications, Supervision
Buildings, Industrial Plants,
Bridges, Grain Elevators,
Garages
802 Metropolitan Bldg.
Minneapolis 1, Minn.

ENGINEERS LABORATORIES, INC.
Soils and Foundation Engineering—
Explorations, Soils, Concrete and Asphalt Testing and Control
4171 Northview Drive **Jackson, Miss.**

BLACK & VEATCH
Consulting Engineers
Water — Sewage — Gas — Electricity
Industry Reports, Design
Supervision of Construction
Investigations, Valuation and Rates
1500 Meadow Lake Parkway
Kansas City 14, Missouri

BURNS & McDONNELL
Engineers — Architects — Consultants
4600 E. 63rd St. Traffic Way
Kansas City 41, Mo.

also, and perhaps even primarily, to the future. This requirement for forward thinking is not as predominant in any of the other professions as it is in engineering.

As to an institution for the engineering profession, Admiral Rickover is not as definite as with respect to the ideal. However, in his suggestion concerning consultation with other experts—"consultation with other experts ought to become as common in engineering as it is in medicine,"—and in his description of the review of nuclear power plant design and safety by a committee of competence in "meteorology, oceanography, nuclear physics, mechanical, electrical and chemical engineering, sanitary engineering, design of pressure vessels, explosives, industrial insurance, and so on," Admiral Rickover dimly foreshadows the institution that may develop to embody the ideal of the engineering profession.

And inspirers? These are yet to come. For a profession the ideal of which is still in the process of formulation, a profession of which the institution embodying this ideal has not yet been developed—for such a profession the inspirers are still in the future.

Let, then, this be a challenge to today's and tomorrow's engineers—to adhere to and strengthen the ideal, to participate in the creation and development of the institution, and to perhaps become, for future generations, one of the inspirers—**End**

About the Author . . .

Mr. Lurie

William Lurie has been with the U.S. Naval Weapons Plant in Washington, D.C. since 1939, first as metallurgist, then as materials engineer, since 1952. He received his B.S. in engineering in 1936 from the College of the City of New York. He is a member of the American Association for the Advancement of Science, American Society for Metals, American Society for Testing Materials, and the Society of Aerospace Materials and Process Engineers.

QUAKER OATS

(Continued from page 40)

are made beyond the demonstrated capability of the men and generally good results are thereby accomplished. Engineers feel they are treated as professional people who are responsible for important work and who, at the same time, are enlarging their experience. This builds an organization of thinking people which results in better products, facilities, and service to our customers."—**End**

GENERAL ELECTRIC

(Continued from page 37)

paper contest, and the company pays the expenses of participants who are required to travel. In addition, assistance is given in the staging and publicizing of the contest. A record of each paper and book authored by an engineer is added to his personnel portfolio and is considered along with his other accomplishments when his performance is appraised, his salary reviewed, and his qualifications for promotion are determined.

Each Instrument Department engineer has a position guide which gives the official title, responsibilities, duties and salary level of his position. Each engineer also has an organization announcement that lists all management, supervisory, and consultant personnel and their titles, and which shows the structure of the engineering organization. The titles "senior engineer" or "consulting engineer" are used to indicate certain individual contributors who have achieved a recognized degree of maturity and reputation in their particular fields. The titles "engineering technician" or "specialist" are applied to persons who do not have an accredited engineering degree.

The West Lynn Engineering Association was established in 1935. It claims to be the oldest group of its type in GE. As a "sounding board" organization open to all male engineering employees, its monthly dinner meetings provide a forum for two-way communication between engineers and man-

PROFESSIONAL DIRECTORY

Missouri-New York

A. C. KIRKWOOD & ASSOCIATES
Engineers
Consultants
7800 The Paseo
Kansas City 10, Mo.

THE C. W. NOFSINGER CO.
Engineers & Contractors
307 East 63rd St. EM 3-1460
Kansas City 13, Mo.

RUSSELL & AXON
Consulting Engineers
Civil — Sanitary — Structural
Industrial — Electrical
Rate Investigations
408 Olive St., St. Louis 2, Mo.
Municipal Airport, Daytona Beach, Fla.

SVERDRUP & PARCEL ENGINEERING CO.
Engineers-Architects
Bridges — Structures — Highways
Industrial & Power Plant Design
Aeronautical and Engine Test Facilities
Missile Launch-site Master Planning and Development
St. Louis San Francisco

RANKIN TESTING LABORATORY
Materials Engineers
Concrete & Asphalt Paving Design
Specification Tests & Inspection
Soil Studies—Chemical Consultants
2616 Leavenworth Omaha 5, Nebr.

JOHN WEBSTER BROWN
Registered Engineer
Civil & Structural
Structures, Hydraulics, Designs & Analysis
642 N. Sierra St. Reno, Nevada
Phone FA 2-3872

F. POWELL FORBES
Specializing in all types of Timber Design and Construction.
100 Summit Ave., Chatham, N. J.

ENGINEERS Incorporated
Building Design
Construction Management
Process & Utilities Engineering
Management Engineering
487 Orange St., Newark, N. J.
HUmboldt 2-7040

LEIGH E. ST. JOHN & ASSOCIATES
Consulting Engineers
99 Hawley Street 86 W. Chippewa Street
Binghamton, N. Y. Buffalo 2, N. Y.

WALTER E. LOBO
Consulting Chemical Engineer
Petroleum & Chemical Process Industries Process Development, Design and Evaluation Economic Studies, Technical Reports
Process Design of Special Equipment
Furnaces Towers Reactors
124 East 40th St. OXford 7-6188
New York 16, New York

BURNS AND ROE, INC.
Engineering, Design, Plans and Specifications — Reports, Cost Estimates — Construction Supervision — Power Generating Plants: Steam, Nuclear, Hydro, Diesel — Aviation Test and Missile Support Facilities — Research and Development — Nuclear, Chemical, Industrial Plants.
160 West Broadway New York 13, N. Y.

CHRISTOPHER J. FOSTER
Consulting Engineers
Port Development, Shipyards, Drydocks, Power Plants, Distribution Systems, Industrial Plants, Offshore Moorings and Drilling Platforms, Surveys, Reports, Estimates, Design, Supervision, Consultation
44 Whitehall Street, New York 4, N. Y.

HARDESTY & HANOVER
Consulting Engineers
Bridges, Fixed & Movable
Highways, Expressways, Thruways
Special Structures
Design, Supervision, Inspection, Valuation
101 Park Avenue New York 17, N. Y.

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
Consulting Engineers
Bridges, Structures, Foundations, Airports, Express Highways, Traffic & Parking
99 Church Street 1805 Grand Avenue
New York 7, N. Y. Kansas City 8, Mo.
704 Standard Building
Cleveland 13, Ohio

MADIGAN-HYLAND
Consulting Engineers
28-04 41st Avenue
Long Island City, New York

EMIL GRUENBERG & ASSOCIATES
Consulting Engineers
Industrial Plants, Utilities, Public & Commercial Buildings
Design — Surveys — Reports
Valuation — Consultation
All Types of Estimates for Private, Public & Armed Forces Installations
20 Vesey St. New York 7, N. Y.

A and R CONSULTING ENGINEERS
M. Newman, P.E.
Specialists in applied mechanics and mathematics, mechanical and thermal structural analysis, plates and shells, dynamics and vibrations, heat transfer.
114-116 228th St., Cambria Heights 11, N. Y.
AR 6-6368

PARSONS, BRINCKERHOFF, QUADE & DOUGLAS
Engineers
Bridges, Highways, Tunnels, Airports, Subways, Harbor Works, Dams, Canals, Traffic, Parking and Transportation Reports, Power, Industrial Buildings, Housing, Sewerage and Water Supply.
165 Broadway, New York 6, N. Y.

PROFESSIONAL DIRECTORY

New York-Ohio

FREDERIC R. HARRIS, INC.
Consulting Engineers
144 East 44th Street
New York 17, N. Y.
Norwalk, Conn. — New Orleans, La.
Toronto, Canada — The Hague, Holland

JOHN V. DINAN
Consulting Engineers
Established 1925
Pre & Post Construction Structural (Building) Examinations, Engineering investigations, Reports, Expert Testimony, Seismograph Studies of Blasting and Pile Driving Vibration, Design, Supervision of Shoring, Underpinning, Foundations.
303 West 42nd Street, New York 36, N. Y.
COlumbus 5-6773

SEELYE STEVENSON VALUE & KNECHT
Consulting Engineers
Richard E. Dougherty, Consultant
Airports, Highways, Bridges, Dams, Water Supply, Sanitation, Tunnels, Industrial Plants, Concrete, Steel, Industrial Waste Disposal, Foundations, Soil Studies.
Civil — Mechanical — Electrical
101 Park Avenue — New York 17, N. Y.

OLE SINGSTAD
Consulting Engineer
Vehicular and Railroad Tunnels, Subways, Ventilation, Expressways, Parking Garages, Air Fields, Foundations, Waterfront Structures
24 State St. — New York 4, N.Y.

SYSKA & HENNESSY, INC.
Engineers
Heating — Ventilating — Air Conditioning
Electric & Sanitation
Design — Reports — Consultation
New York, N. Y.

TIPPETTS-ABBETT McCARTHY-STRATTON
Engineers and Architects
Ports, Harbors, Flood Control, Irrigation Power, Dams, Bridges, Tunnels, Highways, Railroads, Subways, Airports, Traffic Foundations, Water Supply, Sewerage, Reports, Design Supervision, Consultation.
375 Park Ave. — New York 22, New York

PROFESSIONAL DIRECTORY RATES

12 mos., paid in advance	$ 96.00
12 mos., billed monthly @ $9.00 ea.	108.00
6 mos., paid in advance	54.00
6 mos., billed monthly @ $10.00 ea.	60.00

JAMES P. O'DONNELL
Engineers
Professional Engineering for the Petroleum and Process Industries
39 Broadway, New York 6, N. Y.

STEINMAN, BOYNTON, GRONQUIST & LONDON
Consulting Engineers
Highways — Bridges — Structures
117 Liberty Street, New York 6, New York

PRAEGER-KAVANAGH
Engineers
126 East 38th St. — New York 16, N. Y.

MORAN, PROCTOR, MUESER & RUTLEDGE
Consulting Engineers
Foundations for Buildings, Bridges and Dams; Tunnels, Bulkheads, Marine Structures; Soil Studies and Tests; Reports, Design and Supervision.
415 Madison Ave., New York 17, N. Y.
Eldorado 5-4800

AMMANN & WHITNEY
Consulting Engineers
Design and Supervision of Construction of Bridges, Highways, Expressways, Buildings, Special Structures, Airport Facilities.
111 Eighth Avenue, New York 11, N. Y.
724 E. Mason Street, Milwaukee 2, Wisc.

BERNARD PHILLIP ELKIN
Consulting Engineer
Original Equipment Design of Air Tools, Hydraulic Equipment
365 Arlington Ave. — Brooklyn 8, N. Y.

W. F. CRIST
Consulting Engineers
Processing, Steam, Water and Waste Treatment Plants, Materials Handling, Process & Utility Piping, Heating & Cooling, Corrosion Control & Power Hydraulics.
500 East Morehead St., Charlotte 3, N. C.

FRANK L. BECKMAN
Consulting Engineer
Swimming Pools, Allotments, Parking Lots, Paving Plans, Topographic Maps, Court-Plats, Deed Descriptions, Municipal Improvement and Development. Design and Supervision.
702 Valley Crest Drive, Akron 19, Ohio
Phone: TUxedo 2-4249

BARRETT, CARGO, WITHERS AND ASSOCIATES, LTD.
Consulting Engineers
Survey—Design—Inspection
Highways — Bridges
Railroads — Municipal Reports
245-249 S. Paint St. — Chillicothe, Ohio
Phone PRospect 3-2286

JONES, HENRY & WILLIAMS
Consulting Sanitary Engineers
Water Works
Sewerage and Treatment
Waste Disposal
2000 W. Central Ave. — Toledo 6, Ohio

H. R. RICHARDS—A. V. ALEXEFF & ASSOCIATES
Consulting — Design
Development — Fabrication
Continuous Processing Machinery
INDUSTRIAL OVENS, INC.
13825 Triskett Rd., Cleveland 11, Ohio
Tel. CL 1-4400

agement. Weekly meetings are conducted by the general manager and his section-level staff. Engineering subsection meetings are held periodically. Special engineering issues of management news letters are used for communications directed particularly to engineers and scientists.

The NSPE Industrial Professional Development Award is presented annually to an industrial employer of engineering personnel which has made an outstanding contribution to the advancement and improvement of the engineering profession through its employment practices. The purpose of the Award is basically two-fold: To give adequate recognition to a firm which has shown outstanding advancement and improvement in the development and application of forward looking engineering employment practices; and to encourage all industrial employers of engineering personnel to adopt progressive engineering employment practices in accord with established professional standards.

The current members of the NSPE Industrial Award Committee are: Robert A. Blackburn, P.E., manager, strategic materials section, engineering and construction division, Koppers Company, Inc., chairman; Louis J. Larson, P.E., consulting engineer, Welding Industries Group, Allis-Chalmers Manufacturing Company; Wayne E. Ault, P.E., manager, engineering, "Automatic" Sprinkler Corporation of America; Roy T. Sessums, P.E., assistant vice president and engineering coordinator, Freeport Sulphur Company; Theodore E. Casselman, P.E., vice president, Stone & Webster Engineering Corporation.

The Phillips Petroleum Company was selected for the Award in 1960.

BER CASE

(Continued from page 47)

involving these factors are his alone to make and should be unequivocal. However, final decisions involving other considerations are strictly the prerogative of this client; therefore, he should exert every effort toward keeping his

PROFESSIONAL DIRECTORY

Ohio-Pennsylvania

TOLEDO TESTING LABORATORY
Engineers and Chemists
Concrete — Soils — Asphalt
Inspection — Tests — Supervision
Consultation — Specifications and
Investigation of
Engineering Works and Materials
1810 North 12th St. Toledo 2, Ohio

JAMES G. PIERCE & ASSOCIATES, Ltd.
Engineers-Consultants
Specialists In Cryogenics
374 West Spring St. Columbus 15, Ohio

GANNETT, FLEMING, CORDDRY & CARPENTER, INC.
Engineers
Water, Sewage, Roads, Turnpikes
Bridges, Airports, Traffic Appraisals
HARRISBURG, PA.
Philadelphia, Pa. Daytona Beach, Fla.
Pittsburgh, Pa. Medellin, Colombia, S. A.

VOGT, IVERS, SEAMAN & ASSOCIATES
Design and supervision of Municipal and Industrial Facilities; Bridges, Highways, Expressways; Buildings, Special Structures, Airports; Diesel, Hydro-Electric, Steam, Power Facilities; City Planning and Reports.
34 West Sixth Street, Cincinnati 2, Ohio
20 North Wacker Drive, Chicago 6, Ill.

A. BEN CLYMER
Consulting Analytical Engineer
Analysis and Simulation of Systems, Processes, Structures, Machines, Vehicles
Development and Application of Equations and Computing Methods
HUdson 8-4610
1672 Barrington Rd. Columbus 21, Ohio

PROFESSIONAL ENGINEERS
PUT YOUR CARD HERE
Keep your name before more than 60,000 readers. It's good business.

HARRY BALKE ENGINEERS
Consulting Engineers
Consulting Service — Reports, Design, Supervision, Research
Bridges, Buildings, Structures, Toll Roads, Expressways, Highways
990 Nassau Street
Cincinnati 6, Ohio

BENHAM ENGINEERING COMPANY AND AFFILIATES
Survey Design & Supervision of
Civil, Mechanical, Electrical
Sanitary Structural
Engineering Projects and
All Types of Building Construction
215 N. E. 23rd Street
Oklahoma City, Okla. Phoenix, Ariz.

FRAZIER-SIMPLEX, INC.
Contracting & Consulting Engineers
Furnace Engineering for the
Glass and Steel Industries
486 East Beau Street, Washington, Pa.

THE H. C. NUTTING COMPANY
Testing Engineers—Inspection Service
Foundation Investigation—Test Borings
Soil Mechanics—Seismographic Survey
Construction Control—Soil—Concrete
4120 Airport Road Cincinnati 26, Ohio

ELECTRICAL CONTRACTORS ASSOCIATES, INC.
Contracting Electrical Engineers
Altoona, Penna.

ALBRIGHT & FRIEL, INC.
Consulting Engineers
Water, Sewage, Industrial Wastes and Incineration Problems, City Planning, Highways, Bridges and Airports, Dams, Flood Control, Industrial Buildings, Investigations, Reports, Appraisals and Rates.
Three Penn Center Plaza
Philadelphia 2, Pa.

ADACHE ASSOCIATES, INC.
Engineers
Penthouse, Hotel Hollenden
Cleveland 14, Ohio

CAPITOL ENGINEERING CORPORATION
Consulting Civil Engineers
Dillsburg, Pennsylvania

AERO SERVICE CORPORATION
Aerial topographic maps—photo-maps for engineering projects, anywhere in the world—highways, railroads, cities, power and pipe lines, mining development. Soil studies and electronic surveys of large areas; resources inventories.
210 E. Courtland Philadelphia 20, Pa.

HAZELET & ERDAL
Consulting Engineers
Design, Supervision, Investigations, Reports
Fixed Bridges Movable Bridges
Expressway Systems — Harbor Works, Dams
Dixie Terminal Bldg., Cincinnati 2, Ohio
Monadnock Block, Chicago 4, Illinois
Oding Bldg., Lansing 33, Mich.
Commerce Bldg., Louisville 2, Ky.

MODJESKI AND MASTERS
Consulting Engineers
Bridges, Highways, Structures
Special Foundations
Reports Inspections
Design
Supervision of Construction
900 Sixth St. New Orleans, La.
Harrisburg, Pa. Philadelphia, Pa.

THE KULJIAN CORPORATION
Engineers — Constructors — Consultants
POWER PLANTS
(Steam, Hydro, Diesel)
Oil Refineries, Pipe Lines — Chemical Plants — Textile Plants — Breweries, Food Processing Plants — Airports — Hangars — Army, Navy Installations.
1200 No. Broad St., Philadelphia 21, Pa.

client completely and fully informed on all engineering facets affecting his client's decisions. He should stand ready to make recommendations as to the use of different materials and to substantiate those recommendations by factual information.

In the instant case, the client was dodging his responsibility and putting his consulting engineer in an untenable position. If the original designs were based on equal quality and service, as stated, then the second design placed material A in an inferior position to material B. The engineer, when recommending A, was recommending a lower standard. It had become so by the change in design. It was below B in quality and service.

The engineer should have recommended the award on the basis of B design. The client could then have decided to make the award on the revised A design, based on other factors. The client may waive the impartiality of the engineer between materials on his own responsibility, except for the factor of public safety already noted.

Conclusions:

Q. 1—The engineering firm did not act unethically under the circumstances cited, but it is of the utmost importance that the engineer in such a situation not allow the client's wishes to interfere with his basic duty to protect the public safety.

Q. 2—In the light of Section 12, the engineer acted unethically.

Board of Ethical Review
L. R. DURKEE, P. E.
PHIL T. ELLIOTT, P. E.
A. C. KIRKWOOD, P. E.
MARVIN C. NICHOLSON, P. E.
EZRA K. NICHOLSON, P. E.
PIERCE G. ELLIS, P. E.,
Chairman

Note: *Member Wylie W. Gillespie, P. E., is recorded as concurring in conclusion 1 and not voting on conclusion 2.*

PROFESSIONAL DIRECTORY

D. C. LATELLA & ASSOCIATES, INC.
Management Consultants
Registered Professional Engineers
Reports — Surveys — Installations
624 Widener Building Philadelphia 7, Pa.

AUBURN & ASSOCIATES, INC.
Engineers for Heavy Industry
Electrical, Civil, Mechanical and Piping Professional Staff
A. J. Mosso, P.E. J. F. Schaffer, P.E.
W. H. Truskey, P.E. B. J. Auburn, P.E.
J. A. Shaffer, P.E. C. W. Oettinger, P.E.
P. J. Curry, P.E.
1051 Brinton Rd., Auburn Building, Pittsburgh 21, Pa.

E. D'APPOLONIA ASSOCIATES, INC.
Consulting Engineers
Soil Mechanics and Foundation Engineering
Site Selection and Development
Structural and Applied Mechanics Vibrations
710 Swissvale Avenue CHurchill 2-6530
Pittsburgh 21, Pennsylvania

HEDENBURG AND VENABLE
Consulting Chemists and Engineers
Research—Development—Laboratory Services
Disaster Investigation
6111 Fifth Avenue Pittsburgh 32, Pa.
HIland 1-8045

PETER F. LOFTUS CORPORATION
Design and Consulting Engineers
Electrical • Mechanical • Structural
Civil • Nuclear • Architectural
First National Bank Building
Pittsburgh 22, Pennsylvania

PITTSBURGH TESTING LABORATORY
Testing — Inspection — Analysis
Radiography — Soils Mechanics
Main Office, Pittsburgh, Pa.
32 Laboratories in Principal Cities

PROFESSIONAL ENGINEERS
PUT YOUR CARD HERE
Keep your name before more than 60,000 readers. It's good business.

GILBERT ASSOCIATES, INC.
Consulting Engineers and Designers
Power and Industrial Plants
Nuclear Engineering
Sanitary — Safety
Construction Management
Business and Economic Research
Chemical Laboratory
New York READING, PA. Washington

MICHAEL BAKER, JR., INC.
Consulting Engineers, Planners & Surveyors
Airport, Highway & Bridge Design; Water & Sewerage; Municipal Engineering; Photo Mapping; City Planning, Urban Renewal & Redevelopment Soils Lab; Complete Survey Service
HOME OFFICE—ROCHESTER, PA.
JACKSON, MISS. CHARLESTON, W.VA.
HARRISBURG, PA.

V. C. PATTERSON & ASSOCIATES, INC.
Engineers
Refrigeration Specialists
Warehouses — Refrigeration & Insulation
Food Freezing — Low Temp. Refrigeration
Patented System for Correction of Frost-heaved Floors
30 East King Street York, Penna.

FORREST and COTTON, INC.
Consulting Engineers
Regional Water Supplies
Water and Sewage Works
Industrial Development
Airports — Dams
Appraisals — Reports
600 Vaughn Building Dallas 1, Texas

JACK AMMANN, INC.
Engineers & Surveyors
World-wide service in furnishing aerial photography, topographic maps, cross section data, mosaics, and related services for all types of engineering projects. Our twenty-eighth year.
931 Broadway San Antonio, Texas

FREESE, NICHOLS & ENDRESS
Consulting Engineers
407 Danciger Building
Fort Worth, Texas

LOCKWOOD, ANDREWS & NEWNAM
Consulting Engineers
Water Works, Sewerage & Sewage Disposal, Public Works, Structures, Earthworks, Mechanical & Electrical.
Reports — Design — Supervision
Surveys — Valuations
Corpus Christi — Houston — Victoria, Texas

GATES ENGINEERING COMPANY
Consulting Civil and Mining Engineers
Reports — Appraisals — Valuations
Consultations — Examinations
Coal Land Development
Systems and Methods of Mining
203½ N. Kanawha St. 500 Quarrier Bldg.
Beckley, W. Va. Charleston 1, W. Va.
CLifford 2-5338 DIckens 4-3573

SPECIAL REPORT

(Continued from page 41)

professional registration or graduation from an accredited engineering curriculum, including equivalent professional engineering experience, and

(9) Since the public would gain from more intense application of merit system principles among employees involved in administering Federal and state aid programs, legislation forming such programs should require that these employees be covered by an appropriate merit system.

Perhaps the best measure of these principles is that none of them are new or untried. In one state or another, each of these recommendations is a part of normal policy, and in all cases they seem to work smoothly, and as positive factors in over-all state administration.

That more general use of these principles seems to be to the general advantage of the states themselves, the general public and the engineering profession is unquestionable. Perhaps the best summation of what stands to be gained is stated in the introduction to *The Engineer in State Government*:

"In this rapidly changing age of phenomenal technological advancements, the role of the engineer has become increasingly significant and vital to the efficient and expeditious solution of many complex and novel problems. While rocketry, missiles and space travel have been making headlines in all of the country's news media, our burgeoning population and industrial productivity have created domestic engineering problems no less demanding and urgent. Urbanization, super highways, irrigation, water and air pollution, conservation and a variety of public works needs have, each in its own way, added tremendously to the many problems of state and local governments. And solutions to practically all of these problems will require a commensurate growth in the quantity and quality of public engineering services."

Certainly no single study or set of recommendations can begin to cope with so broad an area, but the recommendations set forth in *The Engineer in State Government* will certainly do much to insure a firm foundation from which future growth can proceed.—**End.**

Supplemental Services

SOUTH FLORIDA TEST SERVICE, INC.

Testing — Inspection — Research — Engineers

Consultants and specialists in corrosion, weathering and sunlight testing.

4301 N.W. 7th Street Miami 44, Florida

Member A. C. I. L.

CONCRETE TECHNOLOGISTS, ASSOC.

John C. Sprague, P.E.

Supplemental and Auxiliary Services in Concrete and Concreting Materials

104 Oakmont Drive Marietta, Georgia

AEROGLIDE CORPORATION

Engineers-Manufacturers

Process Drying Systems
Cereal Grains — Charcoal — Produce

Raleigh, N. C. TE 2-6422

Subsurface Investigations

WARREN GEORGE

Henry D. Hammond, P. E.

Any Type Borings *Any Site*
Preliminary Surveys *Reports*

95 River St. Hoboken, N. J.

WATER SERVICE LABORATORIES, INC.

Specialists in Water Treatment
Consulting and Technical Services

Main Office: 615 W. 131 St., N. Y. 27, N. Y.
Offices also in: Phila., Wash. & Richmond

SPRAGUE & HENWOOD, INC.

Drilling Services

Foundation Investigations, Test Boring
Grout Hole Drilling and Pressure Grouting
Diamond Core Drilling

221 W. Olive St., Scranton, Pa.
New York, Phila., Tucson, Pittsburgh, Nashville, Grand Junction, Colorado
Buchans, Newfoundland

PENNSYLVANIA DRILLING COMPANY

Subsurface Explorations — Grouting

Industrial Water Supply — Mineral Prospecting

Large Diameter Drilled Shafts

1205 Chartiers Ave. Pittsburgh 20, Pa.

AERIAL MAP SERVICE CO.

Topographic, Planimetric, Photo Maps for Highways, Mining, Resources, Construction, City Maps, Tax Maps, Photo Geology. Tellurometer Radio Distance Measurements. Triangulation, Electronic Computation.

1016 Madison Ave. Pittsburgh 12, Pa.

AMERICAN AIR SURVEYS, INC.

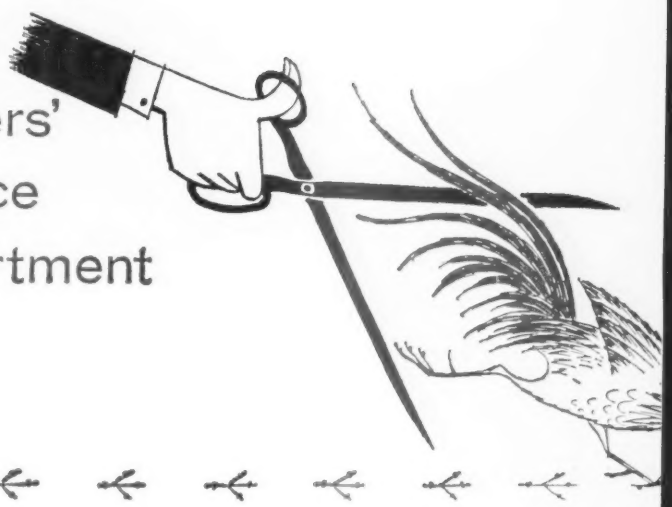
Aerial Topographic Maps—Aerial Photos for

Highways Power & Pipe Lines
Mining Public Works Tax Maps

907 Penn Ave., Pittsburgh 22, Pa.
Branches: Manhasset, N. Y.; Atlanta, Ga.

---

take advantage of AE's readers' service department now!



With this convenient, self-addressed envelope, AE readers can easily obtain additional information on advertisers' products and services. It's easy to use this free service—simply circle the numbers on the reverse side of this sheet, drop the cutout envelope in the mail, and within days you will receive the information requested. Hundreds of our readers take advantage of this offer every month—why don't **you**?

► CLIP COUPON—**Fold Along This Line—Fasten—Mail** ◄

FIRST CLASS
PERMIT NO. 3036-R
Washington, D. C.

BUSINESS REPLY ENVELOPE
No Postage Stamp Necessary If Mailed In The United States

POSTAGE WILL BE PAID BY

AMERICAN ENGINEER
Box 215, Village Station
New York 14, N. Y.

FASTEN HERE ONLY ◗ ◖ **FASTEN HERE ONLY**

Advertisers' Index

A&R Consulting Engineers 61
Adache Associates Inc. 63
Aerial Map Service Co. 65
Aeroglide Corp. 65
Aero Service Corp. 63
Albright & Friel Inc. 63
American Air Surveys Inc. 65
Jack Ammann Inc. 64
Ammann & Whitney 62
Asphalt Institute ..... 2 & 3
Auburn and Associates, Inc. 64
W. L. Badger Assoc., Inc. 60
Michael Baker Jr., Inc. 64
Harry Balke Engineers 63
Barrett, Cargo, Withers and Assoc. Ltd. 62
Frank L. Beckman 62
Bedell and Nelson Engineers Inc. 60
Benham Engineering Co. & Affiliates 63
Black & Veatch 60
Borden Metal Products Co. 22
John Webster Brown 61
Burns & McDonnell 60
Burns & Roe, Inc. 61
Capitol Engineering Corporation 63
Conrad M. Carlsrud 59
James H. Carr, Jr. 59
Homer L. Chastain & Associates 59
A. Ben Clymer 63
Chas. W. Cole & Son 60
Commonwealth Associates Inc. 60
Concrete Technologists, Assoc. 65
Consoer, Townsend and Associates 59
W. F. Crist 62
Crystal Lake Engineering Co. 59
Cubic Corp. 9
Dames & Moore 59
E. D'Appolonia Assoc., Inc. 64
Dean Products 10
De Leuw Cather & Company 59
John V. Dinan 62
Dryden—East Hotel 4
Electrical Contractors Assoc., Inc. 63
Bernard Phillip Elkin 62
Engineers, Inc. 61
Engineers Laboratories, Inc. 60
Eustis Engineering Company 60
Fay, Spofford & Thorndike, Inc. 60
F. Powell Forbes 61
Forrest and Cotton, Inc. 64
Christopher J. Foster 61
Frazier-Simplex, Inc. 63
Freese & Nichols & Endress 64
Galv-Weld 20
Gannett, Fleming, Corddry & Carpenter, Inc. 63
Gates Engineering Co. 64
Gilbert Associates, Inc. 64
Emil Gruenberg & Assoc. 61
Hardesty & Hanover 61
Frederic R. Harris, Inc. 62
Hazelet & Erdal 63
Hedenburg and Venable 64
The Hinchman Corporation 60
Howard, Needles, Tammen & Bergendoff 61
Industrial Ovens, Inc. 62
IBM Corp. ..... Back Cover
International Engineering Co., Inc. 59
Jones, Henry & Williams 62
Kaiser Engineers 59
A. C. Kirkwood & Associates 61
The Kuljian Corporation 63
D. C. Latella & Associates, Inc. 64
Walter E. Lobo 61
Lockwood, Andrews & Newnam 64
Peter F. Loftus Corp. 64
Madigan-Hyland 61
Metcalf & Eddy 60
Miner and Miner 59
Modjeski and Masters 63
Moran, Proctor, Mueser & Rutledge 62
John J. Mozzochi & Assoc. 59
Niagara Blower Co. 12
The C. W. Nofsinger Co. 61
The H. C. Nutting Co. 63
James P. O'Donnell 62
Parsons, Brinckerhoff, Quade & Douglas 61
V. C. Patterson & Associates, Inc. 64
Pennsylvania Drilling Co. 65
James G. Pierce & Assoc., Ltd. 63
Pioneer Service & Engineering Co. 59
Pittsburgh Testing Laboratory 64
Praeger-Kavanagh 62
Rankin Testing Laboratory 61
Robert and Company Associates 59
Russell and Axon 61
Leigh E. St. John & Assoc. 61
A. C. Sampietro 60
Sargent & Lundy 59
Victor O. Schinnerer & Co., Inc. 14
Seelye Stevenson Value & Knecht 62
Servis, Van Doren & Hazard 60
Ole Singstad 62
Soil Solidifiers, Inc. 60
Soil Testing Services, Inc. 59
South Florida Test Service, Inc. 65
Sprague & Henwood, Inc. 65
Stanley Engineering Company 59
Stanpat Co. 15
Steinman, Boynton, Gronquist & London 62
Syska & Hennessy, Inc. 62
Sverdrup & Parcel Engineering Co. 61
Tippetts-Abbett-McCarthy-Stratton 62
Toledo Testing Laboratory 63
United Steel Fabricators 13
Vogt, Ivers, Seaman & Associates 63
Warren George 65
Warren & Van Praag, Inc. 59
Water Service Laboratories, Inc. 65
Walter H. Wheeler 60
Whitman, Requardt and Associates 60
Wight & Co. 60
Wilberding Co., Engineers 59
Wilson & Company 60

For Your Convenience . . .

's EXPANDED Readers' Service Department!

Now it is easier than ever for you to get information f-a-s-t on new products and services. The other side of this page when folded makes a *self-addressed reply envelope* that is all ready to come back to us. All you have to do to use it is to first read the advertisements, and the "Progress in Products" and "New Literature" features in every issue, noting that each makes specific reference to numbers on the form below.

Then if you want more information about any item, simply circle the corresponding number on the form, sign, fold, fasten and MAIL TODAY!

We do the rest. And within days, the data and literature you want is on its way to you.

Take advantage of this FREE service. Use this handy envelope NOW!

JULY, 1961

Please have information sent to me on items circled below:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20 Page 2 & 3
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40 Back Cover

Additional Remarks: .....

.....

My Name ..... **Title** .....

Company Name .....

Address .....

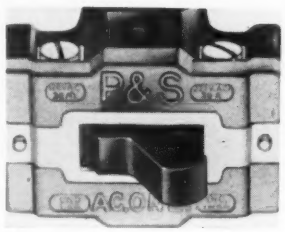
City ..... **Zone** ..... **State** .....

Progress in Products

AUTOMATIC LEVEL — Item 30

Geo-Optic and Paper Corp. has introduced a new automatic level. It is compact, portable; 6" high, 2" long and 1½" wide; convenient in field work because of its new weight of only 1.21 lbs. or 1.54 lbs. with leather case. Uses no bubble tube for leveling so elevations can be determined right away. It may be tilted up to three degrees without affecting the line of sight which saves much time used with conventional levels. Leveling can be done for a distance up to 35 yds.

30 AMP SWITCHES — Item 31



New high capacity 30 ampere AC switches, specification grade for heavy duty service, are now available from Pass and Seymour. 30 AC1 Single Pole and 30 AC3, Three-Way can be used to full capacity on fluorescent loads at voltages from 120 to 277 and to full rated capacity on tungsten filament lamp loads. Features include heavy silver alloy contacts; side or back wiring; sturdily constructed bodies with green plastic covers and washer type plaster ears.

SYSTEMS — Item 32

A new, prefabricated piping system for the overhead distribution of steam, hot water, process liquids and refrigeration lines is called Plasti-clad. It consists of the pipe and insulation covered with aluminum foil, over which are two wrappings of fiber glass integrated within the Plasti-clad material. A final color coat of Plasti-clad is applied to finish the unit. Standard color is green; alternate colors are available. The entire system is factory prefabricated complete with expansion loops, anchor units, elbows and "T" units ready for installation. Straight run units are prefabricated in 21 foot lengths, pipe joints can be either field welded or threaded.

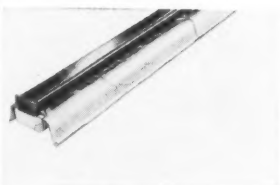
SOLID-FIL — Item 33

Advance Transformer Co. offers an innovation in fluorescent lamp ballast design which incorporates *unitized ballast construction* . . . ballast housing, core and coil, capacitor and the new Advance "SOLID-FIL" development combine to offer drip-free unitized construction. The basis of the improved "SOLID-FIL" material is polyester which differs from ordinary solid fill materials in that it retains a pliable consistency and will not become brittle with age or heat, permitting retention of its excellent thermal and sound deadening characteristics. Accelerated heat tests proved no deterioration or drippage of the Advance "SOLID-FIL" developments.

HIGH-TENSILE BOLT — Item 34

A new type high tensile structural rib bolt with rolled interrupted ribs, said to give a high clamping force and a body-bound fit in a structural joint, is available from the Automatic Nut Company. The bolt is designed with proper length of rib for thickness of plates, to prevent riding of any steel on bolt threads. Full thickness of plates is in bearing at all times. It also features flat head and taper at the start of the ribs.

FLUORESCENT DESIGN — Item 35



A new fluorescent fixture design introduced by Wheeler Reflector has resulted in longer ballast and tube life on the job. Air space, provided by an embossment in the end of each reflector, separates the channel from the reflector. Cool air circulating freely through this space ventilates the entire fixture so that both tubes and ballasts operate at lower temperature giving increased life, fewer replacements, less maintenance and dark-time.

POLYETHYLENE TAPE — Item 36

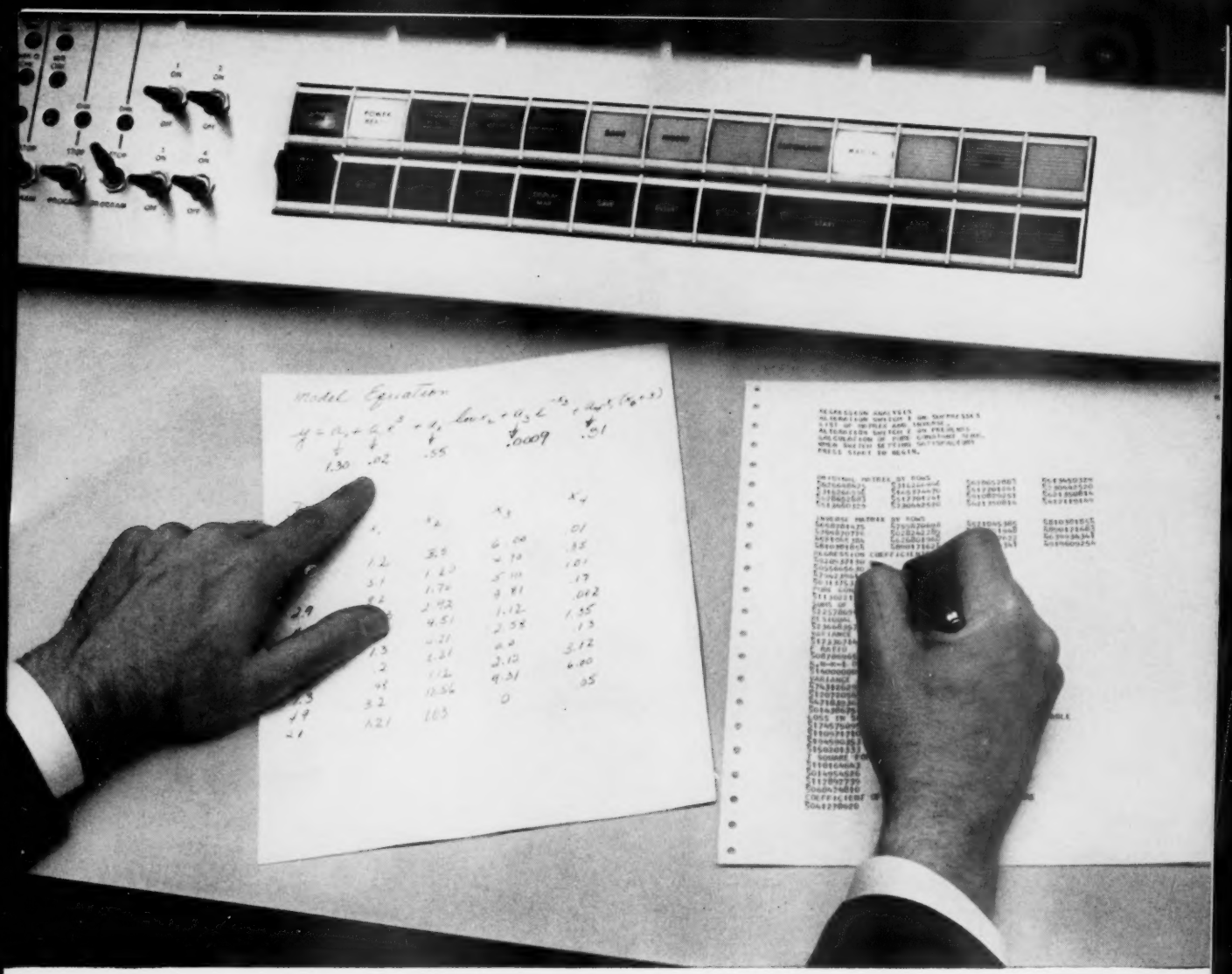
A new pressure-sensitive polyethlyene tape is announced by Fasson Products. It is recommended for taping jobs of all kinds including freezer packaging, household repair and protection, closure and sealing of plastic covers and liners, drums, bags, tarpaulins, etc., waterproof coating or sealing, corrosion protection of piping, and sealing seams in concrete forms. The tape is stretchable, conforms to most variations of surfaces and contours to which it is applied and is extremely resistant to water, many chemicals and solvents. It performs throughout a temperature range of −50°F to +225°F and sustains flexibility at low temperatures. One outstanding property of the tape is the strong bond of its permanent adhesive backing.

NEW COMPUTER — Item 37

A new scientific computer, designed to meet the advanced data processing needs of complex technologies, was announced recently by International Business Machines Corp. The IBM 7072 will be able to process magnetic tapes recorded during engineering tests—jet aircraft wind tunnel trials, for example—despite a difference in the "languages" of the test cell and the computer. Binary data is entered directly into the computer, where it is converted into decimal form automatically and processed for immediate use by engineers. Some of the problems it can handle are: Creation of mathematical models to test product designs, systems, theories; simulation of space flight vehicle trajectories; and design of nuclear reactors.

This feature describes new products of general interest to professional engineers. For further information, circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

These listings are informational and are not an endorsement of the products, nor of the manufacturer's claims.



Want to find the coefficients? It's easy with the new Regression Analysis program for the IBM 1620

Here's another program offered free-of-charge to users of the IBM 1620 Data Processing System. It gives you the kind of results you might expect only from a much more expensive computer. But users of the 1620 know that its low rental cost is deceptive. The 1620 packs *more computing power per cubic inch* than any other computer in its size range.

The Regression Analysis program is a good example. Suppose you want a fit for production purposes. If you employ more than two variables you probably have difficulty visualizing the representation of your data. If linearity is not the case, you must often guess blindly at a polynomial of high degree, accept or reject the fit with something approaching a sixth sense, and either try again or settle for the results you have.

The new Regression Analysis program lets you handle expressions containing up to *24 variables*. If you have the even more complicated task of handling many dependent variables, the program will generate regression coefficients with a maximum number of dependent variables not exceeding one-half the number of independent variables.

This program will also fit non-linear functions and hyper-surfaces. Compare this performance with that of any other computer in the 1620's price range.

A basic 1620 installation rents for just $1600 per month. For details, contact your local IBM Representative.

IBM's 1620 is a compact desk-size computer.

IBM®
DATA PROCESSING